The Royal Navy
and Nuclear Weapons

being a Thesis submitted for the degree of
Doctor of Philosophy
in the University of Hull

by

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July 1999
CONTAINS PULLOUTS
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The illustration at the foot of the title page shows ships of the Reserve Fleet in the Coal Dock at West Hartlepool in 1956. Vessels were dispersed here and at other locations around the UK to avoid a possible nuclear attack on the main ports and naval bases.
Acknowledgements

I should like to thank staff at the Public Record Office in Kew, the Scott Polar Research Institute, the University Library and the Churchill College Archives Centre in Cambridge, the Liddell Hart Centre for Military Archives in London, and especially Iain Goode at the Ministry of Defence and Janet Giles at the Hartley Library in Southampton for their cheerful and in some cases unbidden assistance. Ian Clark offered encouragement to start the project. Harry Pout and Jock Gardner were kind enough to read the manuscript and offer comments on the content; my father and Ed Wynn assessed its grammar and readability. They are not responsible for any errors which remain. Eric Grove supervised the work enthusiastically. Bobby Woolrych, Harry Pout and Edgar Anstey were especially helpful with their recollections of work on global war studies in the 1950s and 1960s, and extremely hospitable in inviting me to their homes. Thanks are due also to my parents in Cleethorpes, to Stew Sage and Dave Evers in Cambridge, to Roger and Debbie in Little Chalfont, to Anthony Heading and Adrian and Caroline in London and to my Great Uncle Geoff in Southampton; all were on hand with various combinations of beer, wine, port, whisky and a bed or a floor to sleep on as I travelled the country working in the archives. Don Eldridge arranged the loan of a computer. Special thanks to Gordon Taylor, who taught me to love history; to Brendan Bradshaw, who patiently encouraged me at college when I didn’t appreciate it; to Adrian, who spent a night in the Leckhampton (before it changed hands) persuading me to give the project a go; and to Professor O’Sullivan at the Politics Department in Hull, who sent an encouraging Christmas card each year. Finally again to my parents, for bringing me up nicely, and to Alison for e-mailing me when she did.
### Abbreviations

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<th>Description</th>
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<td>1L</td>
<td>First Lord of the Admiralty</td>
</tr>
<tr>
<td>1SL</td>
<td>First Sea Lord</td>
</tr>
<tr>
<td>2SL</td>
<td>Second Sea Lord</td>
</tr>
<tr>
<td>4SL</td>
<td>Fourth Sea Lord</td>
</tr>
<tr>
<td>5SL</td>
<td>Fifth Sea Lord</td>
</tr>
<tr>
<td>A/ACAS(Ops)</td>
<td>Assistant to ACAS (Operations)</td>
</tr>
<tr>
<td>A/ACAS(P)</td>
<td>Assistant to ACAS (Policy)</td>
</tr>
<tr>
<td>AAGW</td>
<td>Air to air guided weapons</td>
</tr>
<tr>
<td>ABC</td>
<td>Popular name for Admiral Sir Andrew Cunningham, later Viscount Cunningham of Hyndhope; also Atomic, Biological and Chemical Defence</td>
</tr>
<tr>
<td>ABCD</td>
<td>Atomic, Biological and Chemical Defence</td>
</tr>
<tr>
<td>ABM</td>
<td>Anti-ballistic missile</td>
</tr>
<tr>
<td>ACAS(OR)</td>
<td>Assistant Chief of the Air Staff (Operational Requirements)</td>
</tr>
<tr>
<td>ACAS(P) or (Pol)</td>
<td>Assistant Chief of the Air Staff (Policy)</td>
</tr>
<tr>
<td>ACNS</td>
<td>Assistant Chief of Naval Staff</td>
</tr>
<tr>
<td>ACNS(W)</td>
<td>ACNS (Weapons)</td>
</tr>
<tr>
<td>ACSA(P)</td>
<td>Assistant Chief Scientific Adviser (Projects) [MoD]</td>
</tr>
<tr>
<td>A/DDOps(B)</td>
<td>Assistant to the Deputy Director of Operations (Bombing) [Air Ministry]</td>
</tr>
<tr>
<td>ADGW(N)</td>
<td>Assistant Director General. Weapons Department (Navy) [MoS]</td>
</tr>
<tr>
<td>Adm</td>
<td>Admiral</td>
</tr>
<tr>
<td>AdmFlt</td>
<td>Admiral of the Fleet</td>
</tr>
<tr>
<td>A/DNC</td>
<td>Assistant Director of Naval Construction</td>
</tr>
<tr>
<td>AES</td>
<td>Strategic Uses of Atomic Energy [Subcommittee of the DRPC]</td>
</tr>
<tr>
<td>AM</td>
<td>Air Marshal</td>
</tr>
<tr>
<td>AOC-in-C</td>
<td>Air Officer Commanding-in-Chief</td>
</tr>
<tr>
<td>ARD</td>
<td>Armaments Research Department [MoS]</td>
</tr>
<tr>
<td>ARDE</td>
<td>Armament Research and Development Establishment</td>
</tr>
<tr>
<td>A/S</td>
<td>Anti-submarine</td>
</tr>
<tr>
<td>ASROC</td>
<td>A US rocket powered anti-submarine weapon</td>
</tr>
<tr>
<td>ASWWP</td>
<td>Anti-submarine Warfare Working Party</td>
</tr>
<tr>
<td>AVM</td>
<td>Air Vice Marshal</td>
</tr>
<tr>
<td>AWRE</td>
<td>Atomic Weapons Research Establishment</td>
</tr>
<tr>
<td>BJSM</td>
<td>British Joint Staff Mission (in Washington DC)</td>
</tr>
<tr>
<td>BNDSG</td>
<td>British Nuclear Deterrent Study Group</td>
</tr>
<tr>
<td>Brig</td>
<td>Brigadier</td>
</tr>
<tr>
<td>CA</td>
<td>Controller Air [MoS]; also Confidential Annex (to minutes of e.g., Chiefs mtg)</td>
</tr>
<tr>
<td>Capt</td>
<td>Captain (RN unless stated)</td>
</tr>
<tr>
<td>CAS</td>
<td>Chief of the Air Staff</td>
</tr>
<tr>
<td>CDJPS</td>
<td>Civil Defence Joint Planning Staff</td>
</tr>
<tr>
<td>Cdr</td>
<td>Commander</td>
</tr>
<tr>
<td>Cdr(E)</td>
<td>Commander (Engineering branch)</td>
</tr>
<tr>
<td>CDS</td>
<td>Chief of the Defence Staff</td>
</tr>
<tr>
<td>CGWL</td>
<td>Ministry of Supply Controller Guided Weapons and Electronics</td>
</tr>
<tr>
<td>CIGS</td>
<td>Chief of the Imperial General Staff</td>
</tr>
<tr>
<td>c-in-C</td>
<td>Commander-in-Chief</td>
</tr>
<tr>
<td>CINCAFMED</td>
<td>NATO C-in-C Allied Forces Mediterranean</td>
</tr>
<tr>
<td>CINCCHAN</td>
<td>NATO C-in-C Channel</td>
</tr>
<tr>
<td>CINCEASTLANt</td>
<td>NATO C-in-C Eastern Atlantic</td>
</tr>
<tr>
<td>CNO</td>
<td>(US) Chief of Naval Operations</td>
</tr>
<tr>
<td>CO</td>
<td>Commanding Officer</td>
</tr>
<tr>
<td>Ctrlr</td>
<td>Third Sea Lord and Controller of the Navy</td>
</tr>
<tr>
<td>DA(Arm)</td>
<td>Director Air (Armaments) [MoS]</td>
</tr>
<tr>
<td>DASW</td>
<td>Director of A/S Warfare [Admiralty]</td>
</tr>
<tr>
<td>DAW</td>
<td>Director of Naval Air Warfare [Admiralty: formerly DAWT]</td>
</tr>
</tbody>
</table>
The Royal Navy and Nuclear Weapons

DAWT  Director of Naval Air Warfare and Flying Training [Admiralty; later DAW]
DCAS  Deputy Chief of the Air Staff
DCNS  Deputy Chief of Naval Staff
DDOR2  Deputy Director of Operational Requirements 2 [Air Ministry]
DFSL  Deputy First Sea Lord
DGAW  Director General Atomic Weapons [MoS official]; also sometimes used in place of usual DGD for Director Gunnery and Anti-Air Warfare [Admiralty]
DGD  Director Gunnery Division [Admiralty; formerly Director Gunnery and Anti-Air Warfare Division]
DGGW  Director General Guided Weapons [MoS]
DIS  Defence Intelligence Staff
DNC  Director and Department of Naval Construction [Admiralty]
DNI  Director and Division of Naval Intelligence [Admiralty]
DNO  Director and Department of Naval Ordnance [Admiralty]
DNOR  Director(ate) of Naval Operational Research [Admiralty; later DOR]
D of N  Director of Navigation [Admiralty; later DND]
D of Ops(B&R)  Director of Operations (Bombing and Reconnaissance) [Air Ministry]
D of P  Director of Plans Division [Admiralty]
D of P(Q)  Director of Plans Division (Q) (i.e., administrative planning) [Admiralty]
DOPs(ATO)  Director of Operations (Air Transport) [Air Ministry]
DOR  Director(ate) of Operational Research [Admiralty; formerly DNOR]
DOR(C)  Director of Operational Requirements C [Air Ministry]
DPR  Director(ate) of Physical Research [Admiralty]
DRC  Defence Research Committee
DRPC  Defence Research Policy Committee
D Sec(G)  Deputy Secretary (General) [Admiralty civilian]
DTASW  Director of Torpedo, A/S and Mine Warfare [Admiralty]
DTD  Director Trade Division [Admiralty]
DTSD  Director of Tactical and Staff Duties Division [Admiralty; later Tactical, Ship Requirements and Staff Duties]
DUS(P)  Deputy Under Secretary (Policy) [MoD]
DUSW  Director of Undersurface Warfare [Admiralty]
EDP  Emergency Defence Plan
FAA  Fleet Air Arm
FBM  Fleet Ballistic Missile
FFWP  Future Fleet Working Party
FM  Field Marshal
FOAC  Flag Officer Aircraft Carriers
FOAH  Flag Officer Air (Home)
FOS  Flag Officer Scotland
FOS(M)  Flag Officer Submarines
Gen  General
GSP  Global Strategy Paper
HMSO  Her Majesty's Stationery Office
H of M  Admiralty Head of Military Branch
IRBM  Intermediate Range Ballistic Missile
ISS  Institute of Strategic Studies
JIC  Joint Intelligence Committee
JGWC  Joint Global War Committee
JIGSAW  Joint Interservice Group for the Study of All-out War
JPS  Joint Planning Staff
JTWC  Joint Technical Warfare Committee
KCL  King's College London (Liddell Hart Centre for Military Archives)
kt  kilotons; also knots (nautical miles per hour)
LtCdr  Lieutenant Commander
LtCol  Lieutenant Colonel
MATCH  Manned A/S Torpedo Carrying Helicopter (project resulting in Westland Wasp)
MGen  Major General
MLF  NATO Multi-lateral Force
MoD  Ministry of Defence
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MoS  Ministry of Supply
MRAF  Marshal of the Royal Air Force
MRBM  Medium Range Ballistic Missile
Mt  megatons
mtg  meeting
NATO  North Atlantic Treaty Organisation
NAVWAG  US Navy Naval Warfare Analysis Group
NBC  Nuclear, Biological and Chemical
NCRE  Naval Construction Research Establishment [Admiralty; formerly UNDEX]
NDB  Nuclear Depth Bomb
NID  Naval Intelligence Department
nm  nautical miles
NPG  Nuclear Planning Group [NATO]
OAW  Operational Use of Atomic Weapons [working party of Chiefs, later DRPC]
OR  Operational Requirement; also Operations Research
PEP  Port Emergency Planning
PRO  Public Record Office
PS/DCAS  Private Secretary to DCAS
pubd  published
RAdm  Rear Admiral
RAE  Royal Aircraft Establishment
R&D  Research and Development
RCNC  Royal Corps of Naval Constructors
RFA  Royal Fleet Auxiliary
RIIA  Royal Institute of International Affairs
RN  Royal Navy
RNAS  Royal Naval Air Station
RNC  Royal Naval College
RNR  Royal Naval Reserve
RNVR  Royal Naval Volunteer Reserve
RUSI  Royal United Service Institution (later Royal United Services Institute for Defence Studies)
SACEUR  NATO Supreme Allied Commander Europe
SACLANT  NATO Supreme Allied Commander Atlantic
SAGW  Surface to air guided weapons
SCDS(N/F)  Secretary to Chief of the Defence Staff (Naval and Air Force)
Sec/ISL  Secretary to First Sea Lord
SIPRI  Stockholm International Peace Research Institute
SLBM  Submarine launched ballistic missile
SSBN  Nuclear-powered ballistic missile submarine
SSN  Nuclear-powered submarine
SUBROC  a US submarine-launched rocket powered anti-submarine weapon
Supt AGE  Superintendent Admiralty Gunnery Establishment
UKAEA  United Kingdom Atomic Energy Authority
UNDEX  Underwater Explosion Research Establishment [Admiralty; later NCRE]
UP  University Press
USAEC  United States Atomic Energy Commission
USN  United States Navy
USS  Under Secretary (Staff) [Admiralty or Air Ministry]; also United States Ship
VAdm  Vice Admiral
VC  Victoria Cross
VCAS  Vice Chief of the Air Staff
VCDS  Vice Chief of the Defence Staff
VCNS  Vice Chief of Naval Staff
VLF  Very Low Frequency
Introduction

'We didn't win the war,' thought Sir Godber, 'we just refused to lose it.' Stirred to a new belligerency, he reached for the poker and poked the fire angrily and watched the sparks fly upwards into the darkness.

(Tom Sharpe, Porterhouse Blue)

This is a study of British thinking about nuclear weapons in the period up to about 1970. It examines the subject from the perspective of one interest group, the Royal Navy, in the belief that this can offer new insights compared to previous work in the field. It argues that the Navy nearly always lacked enthusiasm for nuclear weapons, and seeks to explain this by reference to practical considerations and wartime and prewar experiences. It relies heavily upon working-level documentary sources, rather than the 'commanding heights' of defence decision-making and inter-service debates. Chapter one, on early knowledge of and reactions to the atomic bomb, is followed by chapters covering 'broken-backed warfare' and naval interest in offensive nuclear weapons during the 1950s. These chapters use recently declassified documents to outline developments hitherto poorly understood. They argue that broken-backed warfare had considerably greater intellectual and practical foundations than has previously been acknowledged, and that the Navy's interest in a share of the strategic deterrent role has been overstated. Chapters four and five cover the stories of 'nuclear stalemate,' Polaris and tactical nuclear weapons, especially in the central period 1958-62, but extending forwards to 1970 in places. They present further new documentary evidence, reinforcing the conclusion that deterrence was of less interest to the Navy than conventional warfare, and strategy of less interest than tactics, but suggesting that towards the end of the 1960s interest especially in anti-submarine nuclear weapons was growing. The conclusion looks at change and continuity throughout the period, compares British, American and Russian experiences and offers some thoughts on the value of military technological innovation. A short appendix presents the limited evidence so far available on naval nuclear weapons stockpiles.

No secondary work has yet been published that examines the Royal Navy and nuclear weapons specifically, although a great many studies in related areas contain useful and relevant information. Textbooks on nuclear strategy provide essential background, although they tend to focus on American developments; Lawrence Freedman's is perhaps the most reliable, and Fred Kaplan's the most readable.1 Margaret Gowing's official histories of atomic energy were the first scholarly studies to include substantial material on British nuclear weapons development, although they carry the story only as far as 1952. 2


American diplomat in London during the period, produced at around the same time what remains the best history of the public political debates on nuclear weapons.\(^3\) John Simpson wrote another history of Britain’s atomic energy programme in the early 1980s, which threw a good deal of light on nuclear weapons policy including, for the first time, tactical nuclear weapons.\(^4\) More recently, the Oxford University Press has published a number of studies of transatlantic diplomacy and high-level political and military decision-making on nuclear weapons, including those of Ian Clark, Nicholas Wheeler, Martin Navias and most recently John Baylis. These are based on declassified government documents for the period up to 1964 and include a variety of comments, not always sympathetic, on the Royal Navy’s contributions to high-level debates.\(^5\) Norris, Burrows and Fieldhouse have also recently attempted to summarise knowledge of the British nuclear weapons programme, but without always making full use of the available documentary evidence.\(^6\)

A large body of work exists on the Royal Air Force and its principal nuclear weapons systems. Humphrey Wynn’s recent official history of strategic deterrent forces is densely written and authoritative; it is complemented by the work of Stephen Ball and Andrew Brookes, whose enthusiast’s account of the V-bombers is entertaining and informative.\(^7\) Stewart Menaul’s history of British nuclear weapons is less conscious of its remarkable concentration upon the RAF’s side of the story.\(^8\) More narrowly focussed, but nevertheless useful, are Brian Cathcart’s book on the production and testing of the first British bomb, Lawrence Freedman’s article on British nuclear targeting, Shaun Gregory’s work on command and control, Ferenc Szasz’s lively account of the British contribution to the Manhattan Project, Baylis’s and Howard’s articles on the makers of nuclear strategy in Britain, and Wilfred Oulton’s personal memoir of the Christmas Island H-bomb tests.\(^9\) Some of the

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\(^7\) Wynn, *RAF Strategic Nuclear Deterrent Forces*; Ball, *The Bomber in British Strategy: Doctrine, Strategy and Britain’s World Role 1945-60*; Brookes, *V-Force: The History of Britain’s Airborne Deterrent*.

\(^8\) Menaul, *Countdown: Britain’s Strategic Nuclear Forces*.

books on American nuclear weapons also contain information on developments in the UK. Of the more general books on British defence, Darby’s on the East of Suez policy and Morton’s on guided weapons development in Australia both deserve a special mention for their usefulness to this study. Earlier works on British defence and nuclear weapons, especially those of Blackett and Buzzard, retain much of their relevance, especially to a study of naval thinking, but have been treated here as contributions to the contemporary debate: primary rather than secondary source material.

The postwar history of the Royal Navy is not yet so well trodden a path as that of nuclear weapons. Admiral Crowe’s dissertation of 1965, based on discussions with many of the leading participants, remains an essential starting point. Eric Grove’s *Vanguard to Trident*, published in 1987, is now the best and most detailed single history of the postwar Navy. Like Norman Friedman’s *Postwar Naval Revolution*, it is heavily based on declassified documents for the first postwar decade; Friedman’s focus on hardware and construction complements Grove’s on policy and operations. Useful and authoritative general accounts of the Royal Navy in the postwar period can also be found in articles by Friedman, Grove, Richard Hill, Joel Sokolsky and Geoffrey Till. An important but rather different perspective is provided by the later chapters of John Wells’s social history. More journalistic works by Desmond Wettern and Cecil Hampshire are also useful; the former in particular provides an extremely densely written chronicle of the Navy’s postwar activities. Richard Humble, on the other hand, strays too far into polemic in his later chapters with an account of the ‘mistakes’ of postwar naval policy, demonstrating no understanding of political or economic reality.

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11 Darby, *British Defence Policy East of Suez 1947-68*; Morton, *Fire Across the Desert: Woomera and the Anglo-Australian Joint Project 1946-80* (despite its ostensibly narrow focus, this is a significantly better history of British missile development than Twigge’s *The Early Development of Guided Weapons in the UK 1940-60*).


13 Grove, *Vanguard to Trident: British Naval Policy since World War II*; Friedman, *The Postwar Naval Revolution*.


Introduction

Focussed studies containing information on naval nuclear weapons include those of Peter Nailor and Ian McGeoch on the Polaris project, and Friedman and others on aircraft carriers and carrier aircraft. Some of these are written by enthusiasts rather than historians, but they contain valuable operational detail; they are especially useful in investigating such questions as the real service entry dates of British nuclear weapons. As with works on nuclear weapons, some earlier naval histories or strategic works, such as those of Roskill, Gretton and Schofield, are treated here as primary rather than secondary sources.

Numerous memoirs and biographies now exist, lending personal colour to the postwar history of the Navy. Philip Ziegler’s monumental biography of Mountbatten is particularly relevant to this study, as are the studies in Malcolm Murfett’s volume on the naval careers of the First Sea Lords, and less weighty but no less readable books on Charles Lambe, Caspar John and Mike Le Fanu.

Edward Ashmore, Henry Leach and Frank Twiss have also left memoirs of their careers in the postwar Navy; in the broader field of defence, Denis Healey’s and Solly Zuckerman’s recollections are also interesting. Leach is rather coy about his service in Whitehall, but the others pull no punches. Although my debt to a great number of writers is therefore considerable, it is probably fair to say that the nuclear histories lack a patient understanding of the Royal Navy’s position, whilst the naval histories neglect nuclear weapons. In exploring this gap I have attempted to write a rather different history from any so far available.

Approach

We live today in the aftermath of the Cold War. A pessimist could still suggest that we are seeing no more than an interglacial, but we are able nevertheless to look back on the postwar period as something of a whole, and to begin to ask broad questions about the development of the international system over these years. Some phenomena now seem more unusual, less inevitable than they did ten years ago. A bipolar balance of power, for example, begins to look a most peculiar state of affairs. An arms race looks very different now that we have a counterexample to those of the Edwardian and interwar periods which ended in wars. Several books have appeared, treating the Cold War as a whole, using new evidence from the archives of both East and West, and bearing titles like We Now Know with some

17 Nailor, The Nassau Connection; McGeoch, ‘The British Polaris Project’ in Gregory et al., Perspectives upon British Defence Policy 1945-70; Friedman, British Carrier Aviation; Marriott, Royal Navy Aircraft Carriers 1945-90; Watton, The Aircraft Carrier Victorious; McCarty, HMS Victorious 1937-69; Dyson, HMS Hermes: A Pictorial History; Beaver, Ark Royal: A Pictorial History of the Royal Navy’s Last Conventional Aircraft Carrier; Allward, Buccaneer; Thetford, British Naval Aircraft Since 1912; Williams, Fly Navy: Aircraft of the Fleet Air Arm Since 1945.

18 Ziegler, Mountbatten; Warner, Admiral of the Fleet; John, Caspar John; Baker, Dry Ginger; Grove on McGrigor, Till on Mountbatten and others in Murfett, ed., The First Sea Lords from Fisher to Mountbatten.

19 Ashmore, The Battle and the Breeze; Leach, Endure No Makewights; Healey, The Time of My Life; Zuckerman, Monkeys, Men and Missiles; Howard Davies, Social Change in the Royal Navy 1924-70.
The Royal Navy and Nuclear Weapons

justification.20 And the threat of large-scale nuclear war, under which millions of people lived for fifty years, now seems remote. Nuclear weapons are still of more than antiquarian interest: the clock on the cover of the Bulletin of the Atomic Scientists, grandly billed as a "symbol of the threat of global catastrophe," still stands at nine minutes to midnight. There are more acknowledged nuclear weapons states in the world than ever before, although there are fewer nuclear weapons. But the body of academic work on nuclear strategy built up during the 1950s and 1960s, especially in the United States, now looks not merely arcane but downright bizarre. Did mature men and women, elected to power by majority vote and with access to the weightiest advice from university professors and successful military officers, really base the security of their people on strategies which could be, and were, reduced to the analogy of American teenagers playing 'chicken' with bashed-up old motor cars? When Herman Kahn wrote his books On Thermonuclear War and Thinking About the Unthinkable in 1960 and 1962 he was motivated by an almost missionary zeal, a belief that it was both necessary and responsible to explore the ultimate implications, the reductio ad absurdum in nuclear strategic thought.21 At a meeting of the Chiefs of Staff in 1958, Lord Mountbatten agreed: "it would be criminal if we did not devote some limited scientific effort to the study of these fundamental questions."22 Today, it is possible to study nuclear strategy with the benefit of hindsight. Away from the pressures of office, Mountbatten came in later years to conceive a strong opposition to nuclear weapons and to their use as the basis of Western defence.23 Many other senior defence figures from the Cold War period have done the same. It is not my purpose however to write an "I told you so" history of the Cold War from the point of view of the anti-establishment groups that opposed nuclear weapons all along, or to claim that Mountbatten and others somehow 'realised' that this emperor had no clothes. I have, on the other hand, carefully chosen a distorting glass through which to view the nuclear age. It will be a central part of my argument that throughout the period under review - roughly the first Cold War and the 'golden age' of academic nuclear strategy - the Royal Navy was less than enthusiastic about nuclear weapons. This lack of enthusiasm was far from moral, and few in the senior service would have had any truck with those of the Campaign for Nuclear Disarmament who marched on Aldermaston, still less with their successors in the peace camps of the 1980s. Few, indeed, ever expressed any outright opposition to British possession of nuclear weapons. Few, either, expressed the view that the atomic bomb was just another weapon, although this charge was laid against them. Instead their lack of enthusiasm was practical;

20 Gaddis, We Now Know: Rethinking Cold War History, see also Isaacs and Downing, eds., Cold War: An Illustrated History 1945-91; Ball, The Cold War: An International History 1947-91; Walker, The Cold War and the Making of the Modern World; Zubok and Pleshakov, Inside the Kremlin's Cold War.

21 See the perceptive and entertaining account of Kahn's work in Kaplan. Wizards of Armageddon, ch.14.


nuclear weapons were largely irrelevant to their major concerns. At the time, such an attitude was easy to condemn as blind conservatism. Had not the 'prehistoric admirals' of the Royal Navy similarly opposed in their day such innovations as the submarine and the locomotive torpedo? Their failure to seize upon the revolutionary importance of the new technology exposed them, in the eyes of such zealots as the Air Staff, as Old Believers. In the mid-1950s British politicians, and especially Minister of Defence Duncan Sandys, viewed nuclear weapons as a cheap and modern basis for the defence of a great power. But an 'independent' deterrent assumed totemic importance thereafter for Conservative and Labour Prime Ministers, until even with extensive American help the word cheap could no longer realistically be applied. Polaris was delivered on time and apparently within a budget of £350 millions; the warhead upgrade programme Chevaline cost £1 billion.24 In retrospect, the Navy's original attitude, rather than that of the airmen and the politicians, looks the more worthy of study.

Many of the existing accounts of British nuclear weapons policy, by concentrating on inter-service debates and rivalries, and diplomatic and political decision-making at the commanding heights, serve to emphasise the importance of nuclear weapons still further, and tend to cast the Navy, like the other services, in a bad light. The historian, trawling through submissions to the Chiefs of Staff or the Cabinet Defence Committee, can be forgiven for thinking that Whitehall was a sad, frustrating and self-absorbed world, the parties in the debate locked, like the Chiefs in the late 1940s, "in a sort of spell of hatred and spite which they could not break."25 Such documents were written expressly to state the view of one or other interest group on a point of contention. Uncontroversial issues did not reach the seniors in Whitehall, and we should look elsewhere for the underpinnings of military and naval thought. I have therefore tried where possible to go beyond the commanding heights of the debate and to look instead at policy implementation, at working-level discussions within the Admiralty, at the motivations and influences behind naval thinking, and at continuity and change therein over the whole period. This, I hope, will give a more rounded view than some of the existing secondary literature, important though it has been for historians to sketch in the main lines of political decision-making. It also, I hope, offers a corrective to the several studies, some quite partisan, that have appeared over the years covering British postwar defence policy from the point of view of the RAF, and which regard nuclear deterrence and the manned bomber as of central importance.

I have one further axe to grind – it is better for the historian to get these things off his chest, so that readers may know what to expect – and that relates to the conventional periodisation of studies of British nuclear strategy. Nuclear weapons were invented during the Second World War, and first used in 1945. Most studies begin therefore at this point, and although some historians have attempted to trace the history of 'deterrence,' and even of 'nuclear fear,' rather further back, little attention has been paid to the need to relate British nuclear policy to issues in

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prewar defence. As early as 1903, two British scientists, Frederick Soddy and Sir William Crookes, had conceived the idea that a gramme of radium could “blow the British Navy sky high.” Rutherford also mentioned the possibility of an atomic explosive in the same year, and the term “atomic bomb” was coined by H G Wells in 1913. The term ‘deterrent’ is equally old. These are trivial examples. Convoy, attack at source, strategic bombing, imperial policing and a host of other issues in postwar defence had all been discussed at tedious length, well before 1945. The shattering experience of the Second World War, still fresh in the minds of men who had in many cases played a prominent part in its events, was also extremely important in setting the scene for postwar policy. As historians look back now at our troubled century, 1945 seems less of a turning point. I make no apology therefore for devoting a fair part of this introduction to an account of prewar and wartime strategic themes.

The rest of the study is arranged thematically, rather than strictly chronologically. In covering a long period during which interest in nuclear weapons waxed and waned, I have encountered an episodic story. I have attempted to recognise the fact that no single ‘party line’ on nuclear weapons usually existed by presenting material on the defensive and offensive, negative and positive impact of nuclear weapons separately, even where I have drawn evidence from the same years. In fact the separation is somewhat artificial. Different and even contradictory opinions were often held on nuclear weapons at the same time, sometimes by individuals who saw no inconsistency in their views. Nevertheless I have attempted to disentangle the threads where I can, and to highlight the trends in thought over time. Thus chapter one, on the period roughly 1945-49, is followed by chapters covering the parallel themes of ‘broken-backed warfare’ and naval interest in offensive nuclear weapons development in the 1950s. Chapters four and five cover the similarly contemporaneous stories of ‘nuclear sufficiency,’ Polaris and tactical nuclear weapons, especially in the central period 1958-62, but extending forward to 1970 in places. I hope the reader will bear with me in this slightly idiosyncratic framework; I believe the complexity of the various parallel trends would make a chronological account still more confusing.

Sources and methodology

This is essentially a documentary history. A vast number of official government documents of the period can now be found in the Public Record Office at Kew, and large collections of personal papers exist in Southampton, Cambridge, London and elsewhere. Other governments, especially in America and Germany, have also released documents which throw light on British nuclear strategy, but the line has to be drawn somewhere, and so for reasons of time and money I have restricted my research to documents available in the UK. I have also been unable to discuss my work with many of the participants. Most of the senior figures mentioned by name

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26 Baylis’s recent survey Ambiguity and Deterrence, for example, runs from 1945 to 1964; Quester, Deterrence before Hiroshima, and Weart, Nuclear Fear: A History of Images, are useful and interesting, but where the effort has been made in Britain to compare prewar and postwar defence, a study of ‘decline’ has been the usual result.

27 See Weart, Nuclear Fear, pp. 18, 25-6; Quester, Deterrence before Hiroshima, pp. 14-5.
Introduction

are dead, although I have had the benefit of discussions or correspondence with those listed in the acknowledgements. Inevitably, such reliance on documents creates problems. As Gaddis puts it:

> the traditional sources upon which [historians] depend – archives, memoirs, contemporary published materials – do little more than suggest the informal lines of influence that flow from close personal friendships or from intimate professional collaboration; conversations occurring in corridors or over the telephone, or at cocktail parties... can at times shape events more decisively than whole stacks of official memoranda that find their way into the archives.

Others have been less kind. Gore Vidal, discussing one of his entertaining historical novels, derides "the scholar-squirrels’ delusion that there is a final Truth revealed only to the tenured few in their footnote maze." As it happens, I was taught at the University of Cambridge, “the home,” says Eric Hobsbawm, “of lost causes in, at all events, modern history,” where there has been “a deliberately neo-conservative reversion – to the most obsolete form of nineteenth-century archive-grubbing: who wrote what and to whom in the Cabinet during the Home Rule crisis or in 1931.”

Oh dear. Am I guilty of nineteenth-century archive-grubbing? In fact, I believe strongly in the common-sense value of traditional humanist history over more modish social-scientific techniques and methodological frameworks.

Nevertheless, a critical attitude to sources, rather than a mere rehearsal of what the documents say, is very important to any such common-sense approach. Official documents are written for a reason, and this reason is seldom faithfully to record the writer’s opinions in full. Even in the British civil service of the 1950s, few had the leisure to write for the sake of it, and such examples as survive of ‘thinkpieces’ superfluous to the day-to-day business of government seem to have been treated with indifference. If our study is naval thought, therefore, we will look in vain for coherent contemporary accounts in the official documents except where these were considered for some reason important. The reason was generally exogenous, whether strategic or financial, although it might also from time to time be a less reactive bureaucratic point-scoring. Examples include McGrigor’s thoughts in 1954 after the decision to build a hydrogen bomb, and Mackay’s work on ‘nuclear sufficiency’ in 1958-59. Also, documents were not necessarily written by those who signed; often a draft was presented for signature, with perhaps a few words of greeting added in manuscript at the foot of the page. We should beware of deducing that the author was revealing his own thoughts. This problem is generally only encountered at senior levels in the British defence bureaucracy

29 Vidal, A View from the Diners Club, p.140.
30 Hobsbawm, ‘Has History Made Progress?’ in On History, pp.60, 66.
31 See e.g., PRO, Capt Ionides’ letter from HMS Diadem of 21 Dec 1948 after Exercise Sunrise in ADM 116/5779; US(F) paper of 19 Jul 1955 – too “frivolous” to be relevant to the ongoing LTDP review – in ADM 205/164; also, more famously, Buzzard’s contributions to the work of the 1953 Defence Review (see below ch.4).
32 See below (ch.2, 4 respectively).
However, and need not throw working-level documents into question. In addition, official documents do not necessarily record what was uppermost in the minds of their authors, but only what needed to be said at the time. Examples include Mountbatten’s various comments over the years on the subject of Polaris. We should not imagine that on 24 April 1959 the First Sea Lord was thinking only, or even primarily, of Polaris simply because a letter of that date survives to his American counterpart. It is likely, on the contrary, that he was extremely busy, to the point of preoccupation, with his impending promotion to Chief of the Defence Staff. Indeed, the exigencies of bureaucratic debate frequently meant that documents accord exaggerated importance to entirely peripheral issues. The irrelevance of Admiralty discussions to the ‘real’ concerns of the Navy was one reason service in Whitehall was disliked by most naval officers. On the other hand, documents are particularly useful in recording decisions reached, or postponed, and subjects discussed. Even if there is no telling what the participants were really thinking, the record of a meeting can tell us for certain that the Vice Chiefs of Staff discussed plans for atomic bombers to operate from aircraft carriers on 11 June 1948, or that storage arrangements for Red Beard tactical nuclear weapons were discussed in detail on 4 September 1958. Such documentary evidence provides dates and facts, and sometimes an indication of the seriousness with which ideas were regarded and some of the points of contention they provoked. It is an indispensable basis on which to proceed. Vidal is right, however, that without imagination history is not only desperately dull but prevented from telling the whole story. In attempting to explain the thoughts and motivations of individuals in the past, we must sometimes risk going beyond what they wrote, or even thought consciously. In setting down a brief for the First Sea Lord, for example, an Admiralty official or staff officer might have had the single thought in mind of refuting the latest suggestion of the Air Ministry. He might deny, or even fail to understand, the interpretation the historian puts upon his words. My hope, on the other hand, is that he might at least be able to say, “Yes, I hadn’t thought of it like that, but you’re right, that is what I think.”

Contemporary published writings provide another vital source for the historian, especially when thought, not decision-making, is his main interest. Valuable indications of thinking beyond the Admiralty building can be found in Navy, the journal of the Navy League, a pressure group formed at the end of the nineteenth century to publicise the requirements of the senior service, and The Naval Review, founded in 1912 as a forum for confidential discussion of professional issues among naval officers. Brassey’s Naval Annual, published each Trafalgar Day, and the Journal of the Royal United Services Institution both came during our period to include increasingly open discussion of strategic ideas among serving officers and academic strategists. In fact, an unbelievable wealth of material

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33 See below (ch. 5).

34 Admiralty papers on the 1955 Long Term Defence Programme, for example, show the discussions focussing more and more on the edges of the debate where savings were easier for the Treasury to wring out of the service ministries; see PRO, ADM 205/164.

35 PRO, COS(48)80th mtg 11 Jun 1948, extract in AIR 8/1792; record of MoD mtg 4 Sep 1958 in DEFE 7/679.
is available: too much, rather than too little. I shall not, like some historians and journalists, indulge in a pious homily on the need for the British government to release more classified papers. The fact is that the preservation of individual papers is something of a lottery; this seems particularly true for papers of special sensitivity, kept apart from regular files and subject to stringent rules on destruction. Governments, with some justification, regard design and operational information on nuclear weapons as a secret, and go to some lengths to keep it that way. But if some documents have been lost or remain classified, then so many are now openly available as to make the broad lines of the story perfectly clear. The historian of Anglo-Saxon England, seeking to answer basic questions like ‘What did Æthelred the Unready’s advisers think of the Danish threat?’ or ‘When did the Exchequer originate?’ would give a great deal for the amount of documentation available to historians of contemporary Britain.

The Royal Navy

The Navy at the end of the war was deployed worldwide, and remained so throughout our period. Although at heart a British institution, staffed by British officers and men, it was shaped to some extent by this overseas experience. In 1945, the Navy’s largest operational force was the British Pacific Fleet, a powerful group of surface ships centred, for the first time, upon the aircraft carrier rather than the battleship. The Pacific Fleet was also the first to operate closely enough with the US Navy to require American signalling books and other support. Many officers, for example the up and coming Captain Mike Le Fanu, liaison officer with the US fleet and later First Sea Lord, gained their first experience of the US Navy, now many times more powerful than their own, in the Pacific. After the war, the Pacific Fleet and its extended – overextended – support chain were dismantled; forces remained in the Far East, however, and were heavily involved in the Korean War, again in close company with the Americans. Later still, the Far East Fleet regained its position as the Navy’s most important with the adoption of the ‘East of Suez’ defence policy and the beginning of the ‘confrontation’ with Indonesia. In the early 1960s, once again, there were more British warships operational East than West of Suez. We should not forget therefore that, militarily speaking, the majority of the action in our period took place on the other side of the world. Commissions in HM ships lasted for eighteen months and officers and men did not see home for extended periods. Instead they enjoyed a life of excitement, or stifled in the heat, at Singapore. In the days before effective air conditioning, many an officer’s health was ruined at the Far East Fleet’s main base, including that of future First Sea Lord Charles Lambe, whose wife stoically noted that:

After tea until 9pm are the worst hours, there is not a breath of air and all the heat of the day rests on the house like a furnace. one is beyond thought, and can

36 The best account of the modern Navy as an institution is Wells, The Royal Navy: An Illustrated Social History 1870-1982; I have also drawn for this account on memoirs, contemporary writings and more political histories including Grove, Vanguard to Trident, and Hampshire, The Royal Navy since 1945.
barely breathe to keep alive. The children by then are tired and cross and need all one’s patience poor darlings.\textsuperscript{37}

Withdrawal from the Far East came only at the end of 1971. Elsewhere, one squadron of warships was maintained in the Persian Gulf, another in the South Atlantic, another in the West Indies. ‘Imperial policing’ remained an important function for the Navy throughout:

I don’t think we ever thought very much about war with a big W. We looked on the Navy more as a World Police Force than a warlike institution. We considered that our job was to safeguard law and order throughout the world – safeguard civilisation, put out fires on shore, and act as guide, philosopher and friend to the merchant ships of all nations.\textsuperscript{38}

The short answer I suppose was showing the Flag. And after all we had maintained a naval presence to keep peace in the area for some hundred and fifty years. Don’t ask a silly question! We cheered people up, did not oppress the poor and were a visible sign of a paternalistic Empire.\textsuperscript{39}

Closer to home, a Mediterranean Fleet was based at Malta and Gibraltar until 1967, when it was merged with the Home Fleet. This was another historical commitment in the sun: British warships had sailed the inland sea since the seventeenth century, and although warlike operations in the Mediterranean were only undertaken once in our period, at Suez in 1956, there was a full round of national and NATO exercising. Malta was in addition something of a social capital for officers, and NATO ceremonial functions served only to underline this. In the interwar years the ‘polo-mad’ Roger Keyes was C-in-C Mediterranean; in the 1950s, as NATO CINCAFMED, his distant successor Charles Lambe endured a strenuous life of diplomatic visits. Mountbatten, another C-in-C and socialite, agreed with Keyes that “polo brought out all the qualities needed by officers in destroyers, submarines and now in the air. I never met a keen, dashing polo player who was not also a good officer.”\textsuperscript{40} Gibraltar, by contrast, had something of an introspective small town atmosphere, cut off from land by Franco’s Spain but playing host, each spring, to combined manoeuvres by the Home and Mediterranean Fleets. This was always a matter for some satisfaction to the officers present, who would then proceed to Malta:

I got back from the Med on Saturday... It was very good to see Malta full again with both Fleets present, and they certainly looked wonderful floodlit at night. I found everybody in good heart with none of this nonsense about loss of morale. The Fleet Air Arm and new Carriers with angled decks and other gadgets were doing wonderfully well, and right on top of the world.\textsuperscript{41}

\textsuperscript{37} Quoted in Warner, Admiral of the Fleet, p.165.

\textsuperscript{38} VAdm Humphrey Smith, quoted in Marder, The Anatomy of British Sea Power. pp.15-16.

\textsuperscript{39} Corson, Call the Middle Watch, p.166.

\textsuperscript{40} Warner, Admiral of the Fleet, p.43; Cecil Aspinall-Oglander quoted in Ziegler, Mountbatten. p.79.

\textsuperscript{41} PRO, McGrigor to Dunbar-Nasmith 23 May 1955 in ADM 205/106.
For all the travel, the social life, the brilliant and appalling weather on foreign stations, the heart and soul of the Navy remained at the bases of the reassuringly named Home Fleet. Devonport, Portsmouth and Chatham were the real bases of the Royal Navy, making it something of a southern English enterprise. Each had its own Commander-in-Chief, generally a sea-going admiral at the end of his career, and each had its own atmosphere. Thanks to the Port Division manning system for ratings, each passed on that atmosphere to the ships based there.\(^{42}\) The North of England was something of a no-man’s-land – where the shipyards were – and although there were bases at Rosyth, Londonderry and elsewhere, these belonged not to any Commander-in-Chief but to the Flag Officer, Scotland and Northern Ireland; they were not so central to the Navy’s culture and history. Rosyth and Scapa Flow were relics of the need to base ships as close as possible to the German High Seas Fleet in the First World War. At Scapa there was, in the words of the song, “no-one here but bloody us, in bloody Orkney.” Londonderry and Tobermory meanwhile were forever associated in naval minds with the miseries of convoy anti-submarine training. Caspar John’s biography recalls the attitude of most officers to such drudgery, telling how the cantankerous First Sea Lord sat restlessly on the bridge during one exercise, finally announcing, “I’m bored. Take me home.”\(^{43}\)

Naval officers

The officers and men of the Royal Navy formed a relatively homogeneous body; their training was expressly designed to foster, if not groupthink, at least esprit de corps. Their numbers fell from 145,000 at the end of the war to 86,000 by 1970.\(^{44}\) Ordinary seamen have left little written or even oral testimony on the policy issues of the postwar period; my concern is chiefly with the officers. What were these men like? Only a brief introduction can be attempted here; little attention has yet been given to the social history of the officer class, and we lack anything approaching Karsten’s hugely entertaining portrait of the nineteenth-century US naval officer.\(^{45}\) With occasional aristocratic exceptions, the officer corps of the Navy came largely from upper middle class families of relatively modest means. Many officers were the scions of military or naval families, although again there were exceptions; one postwar First Sea Lord was the son of the bohemian painter Augustus John. In 1945, entry to the officer training college at Dartmouth was at age thirteen. After four years of general education and training in seamanship, the young officer cadet transferred to sea as a midshipman, joining the gunroom generally of a large surface warship. After the war, the Attlee government made efforts to widen the appeal of

\(^{42}\) See Corson, *Call the Middle Watch,* pp.198-9; Howard Davies, *Social Change in the Royal Navy 1924-70,* pp.20-1.


\(^{44}\) Figures from Grove, *Vanguard to Trident,* app.5.

an officer career, raising the age of entry to Dartmouth to sixteen. In 1956 it was raised still further to eighteen, and the college lost much of its atmosphere of a public school. Midshipmen now went to sea in a frigate or destroyer of the Dartmouth training squadron, although in the 1960s the earlier scheme of dispersal among the ships of the fleet was reintroduced. These developments came too late to affect the careers of senior officers in our period; all had joined the Navy before the war. Their initial training had a practical flavour. Officers were not expected to be academic, but to display ‘officer-like qualities’ or OLQs:

For the most part what emerged was a definite breed of fit, tough, highly trained but sketchily educated professionals, ready for instant duty, for parades or tea parties, for catastrophes, for peace or war; confident leaders, alert seamen, fair administrators, poor delegates; officers of wide interests and narrow vision, strong on tactics, weak on strategy; an able, active, cheerful, monosyllabic elite.  

On leaving Dartmouth, the young officer would elect to specialise: as an engineer, a torpedo man or, better still, a gunnery officer. The conservative influence of the self-perpetuating ‘gunnery mafia’ can be overstated, and it would not be fair to say that the gunnery and torpedo specialists discouraged technical change altogether. Nevertheless, it was a most unusual officer who could forge a career outside the traditional specialisms: Caspar John’s interest in aviation, for example, was initially frustrated at gunnery school, where a more senior officer tore up his first application to train as a pilot with the words “another soul saved.” An officer’s career could endure setbacks: Charles Lambe, for example, was court-martialled as officer of the watch when the cruiser HMS Raleigh ran aground, and Bruce Fraser was imprisoned by the Bolsheviks in Azerbaijan after the First World War. But after a period at the gunnery school HMS Excellent or the torpedo school HMS Vernon, the successful officer would divide his time between sea and shore. He would expect promotion from time to time when his seniority put him in the ‘zone’ and would reach flag rank, if he was good enough, aged about fifty. At this stage he would have had appointments ashore at HMS Excellent, or in one of the Admiralty staff divisions, and as gunnery or executive officer at sea. He would not necessarily have attended the staff college at Greenwich; more important to him was the experience of command at sea in a battleship, an aircraft carrier, or perhaps a squadron of fleet destroyers. Destroyers could be handled more excitingly than bigger ships and their wardrooms were smaller and closer; a number of dashing officers, including Andrew Cunningham, gained preferment by this route. Officers tended to prefer life at sea to life ashore. Despite the absence from loved ones and the lack of privacy, a life of exercising, inspections, ceremonial, regattas and even the obsessive spit and polish on board ship provided a welcome routine. Richard Humble provides an interesting description of Bruce Fraser’s life as C-in-C Home Fleet during the war: breakfast and reading signals at 9am; staff meeting; visits to ships of the fleet and following up their concerns; lunch followed by two hours of ‘thinking time;’ meetings with staffers, reading, some exercise on deck; dinner with guests; final reading of signals and discussion of the following day’s programme;
and to sleep at midnight. Gin, sherry and scotch oiled the wheels of the C-in-C’s programme throughout the day.48

Some elements, notably, are absent from this life. First, very few successful officers had experience of engineering: “the navy’s need for engineers always exceeded its regard for them.”49 Friction between the engineers and their more prestigious brothers of the seaman or executive branch erupted periodically. Engineers, like chaplains, medical or supply officers, wore distinctive uniforms and were in practice denied promotion to the highest rank. Executive officers were hardly technical ignoramuses, and the technical content of their training increased rapidly after the war, but their main interests lay elsewhere. Second, few officers cultivated any interest in submarine or anti-submarine work. As I shall explain later, most convoy escorts in the war were commanded by reservists; submariners constituted in effect a private navy and had little to do with the big ship gunnery men. One officer who specialised in anti-submarine work before the war recalled something of the atmosphere thus:

A/S was looked on rather poorly in those days and many friends raised eyebrows that I should head for such a backwater full of lazy, hard drinkers. As staff A/S officer of a destroyer flotilla in the Spanish Civil War I found that among the four Asdic operators in each of the nine destroyers half only managed to get in four hours operating their sets in a year.50

Finally, and importantly for the present purpose, few officers were very interested in naval strategy. Tactics, and especially the proper way to manoeuvre a fleet, had been a naval preoccupation for centuries. History was also taught to young officers, although a glance at the popular history books of the period gives some idea of what was involved. Geoffrey Callender’s book Sea Kings of Britain, originally intended to inspire hero worship in Osborne cadets, became instead the Dartmouth text and the naval officer’s standard history book.51 This tradition continued with Christopher Lloyd and Michael Lewis, both former Dartmouth masters who transferred to Greenwich as lecturers, and who both published books in the 1950s looking back at least to Tudor times but, significantly, closing the story in 1922 and 1945 respectively.52 Lloyd’s is a classic Sellar and Yeatman view of the world, ending when America is recognised as (joint) top nation and history comes to an end. Both are histories with a distinctly whiggish tinge; in Lewis’s case this is explicit: “a study of pauseless growth in living tissues, progressing by the stern process of

51 Callender, Sea Kings of Britain; see also the revealing discussion in Hattendorf and Goldrick, eds., Mahan is Not Enough, pp.105-11.
52 Lloyd, The Nation and the Navy; Lewis, The History of the British Navy (even 1922 was too recent for Callender, who ended Sea Kings of Britain with Nelson and The Naval Side of British History in 1919; Harry Hinsley later extended the latter work to 1945).
There is much on Drake, the Dutch wars, the growth of Empire, Pitt and the Seven Years’ War, Nelson and Trafalgar, Jutland. Both authors are navalists, setting out what today seems a crude interpretation of maritime strategy. This is less surprising from the standpoint of the 1950s, when trade, colonies and Empire were still expressions of British greatness, than in the 1990s, when most British histories are woven around the theme of decline. Both too are obsessed by the classification of naval strategies as ‘defensive’ or, preferably, ‘offensive’ – as Lewis puts it, “the British, government and people alike, have almost always been offensively disposed.”

The importance of the offensive is the key lesson drawn in particular from copious references to Trafalgar: “engage the enemy more closely”... “no captain can do very wrong if he places his ship alongside that of an enemy.” These two books, along with Clowes’s seven volumes of 1907 and Callender’s three, constituted a recommended reading list as late as 1960. Their central theme was the heroism of offensive battle.

Donald Schurman has given us an excellent scholarly account of the efforts of six men in the late nineteenth and early twentieth centuries to improve naval officers’ education in history and strategy, but is forced to recognise that “the historians did not always, or even generally, convince their machine-minded contemporaries of the value of historical perspective, and the parallels between that age... and our own strike one forcibly.” Herbert Richmond and Julian Corbett wrote histories full of interest and subtle understanding, but both had chequered careers. Richmond, a close confidant of Jackie Fisher and captain at one stage of HMS Dreadnought, was relegated to command of a second class cruiser and later retired from his job at Greenwich because of persistent disagreements with his superiors. With Dewar, Drax and Thursfield, he did much to stimulate thought, founding the Naval Review in 1912 and writing of the importance of political objectives in war at sea, and of trade and blockade as well as battle. Corbett, a civilian but also a visiting lecturer at the war college and a member of Fisher’s circle, also rejected some of the dogmas of naval thought and preferred the distinction between limited and unlimited aims to that between the offensive and defensive. He was forced however into endless circumlocution in his efforts to persuade his students that limited war and blockade, or the maintenance of a ‘fleet in being’ in a favourable situation, were acceptable strategies for an offensive-spirited country like Britain.

Mahan’s insistence on command of the sea through decisive battle was preferred by most officers. Whilst not exactly anti-intellectual, their training

Lewis, ibid. p.7 (he had used almost the same phrase in England’s Sea Officers, p.9).

ibid. p.104.

Nelson’s final signal, and his inspirational letter to his captains before the battle.


Schurman, The Education of a Navy, preface.

Richmond, Statesmen and Sea Power; Corbett, Some Principles of Maritime Strategy, esp. Pt. 1 ch.6.
fostered a preference for the practical over the theoretical, and consequently few had time for academic strategy:

Officers who made any real study of war from the point of view of staff work were regarded as cranks or lunatics, hunters of soft jobs... the gin-and-bitters school were quite content to be left to the guidance of their splendid, but not always highly trained, instincts.\(^5^9\)

To many, Corbett was "the fellow who made everything so complicated and didn’t really want us to shoot it out with the Germans."\(^6^0\) Praising the work of Basil Liddell-Hart, one postwar commentator choicely dismissed most other strategic writings, especially those from overseas, as "so plum dull and repetitive that they ring no bell."\(^6^1\) Such comments will be significant when we consider the writings of US nuclear strategists.

Nor was there a particularly large market for strategic thought, if only because strategy was so few people’s job in the Navy. The Board of Admiralty could draw on the advice of the Naval Staff, but the Sea Lords’ readiness to consult on matters of high policy varied considerably. Strategic subjects appear far more frequently in the Board minutes under Mountbatten, for example, than under Fraser. Mountbatten also discussed such subjects at his weekly staff meetings, and encouraged officers to join in the debate through his periodic newsletters, tempering this encouragement with due regard for secrecy:

Although it is of great importance that Senior officers should clear their minds on this important matter [nuclear sufficiency], and I do not, of course, want to limit discussion on matters which are openly discussed in the newspapers, it is important that no indication should be given of what the official Admiralty views on this question are.\(^6^2\)

But even within the Naval Staff, only the Director of Plans and the Head of M Branch had a real remit to cover issues of broad naval policy. Whilst some Sea Lords and officials occasionally offered their thoughts over the years, few, to judge by their surviving correspondence, did so repeatedly or consistently. A small number of thinkers was surrounded by a much greater number of technicians and implementors. Outside Whitehall, various naval writers contributed to the naval and national press, but only a few – Drax is one example – corresponded with their counterparts on the ‘inside’ and only two, Buzzard and Gretton, emerged from the senior officers’ ranks in the postwar period. Buzzard was positively shunned for his efforts, although Gretton won official approval. There is a distinct feeling meanwhile that clear strategic policy, whilst desirable, was more important for its

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\(^5^9\) Filson Young, quoted in Wells, *The Royal Navy: An Illustrated Social History*, p.90.

\(^6^0\) Peter Stanford in discussion on p.192 of Hattendorf and Goldrick, eds., *Mahan is Not Enough*.


\(^6^2\) PRO, ISL’s bulletin, 29 Sep 1958, Annex B in ADM 205/172. Compare the range of strategy and policy discussions in the Board Minutes for 1956 (ADM 167/146) with those for 1950 (ADM 167/135).
morale benefits than for its own sake. Admiral Sir Guy Grantham, C-in-C Mediterranean, wrote to Mountbatten in 1955 to complain that:

... there is growing unrest in the Service about the future of the Navy...

Several officers have said to me, 'If only the Admiralty would make a statement about the future of the Navy, or could keep us periodically informed of the problems with which they are dealing, we should feel happier and our lives more stable'... As it is, the number of ships decreases steadily, we have no cruisers nor destroyers in sight and no uplift from the thought that we are forging ahead.63

Grantham, one of the half dozen most senior officers in the Navy, offered no strategic prescription of his own. What he wanted was a clear lead on the way ahead; the existence, not the content of a strategy would allow him to sleep easy.

The Admiralty

"Don't think the Admiralty's part of the Navy: far from it. That mistake has caused the downfall of many a promising young officer who has been so foolish as to bring his rough seafaring ways there with him!"64 Numbered in their tens of thousands by the postwar period, Admiralty officials constituted "a magnificent navy on land," a navy which seemed to grow, moreover, as the seagoing Navy dwindled.65

The Admiralty will be encountered most often in these pages as a contributor or group of contributors to the defence policy-making process, although its true function was far wider. As one of the three service departments, alongside the War Office and Air Ministry, the Admiralty was tasked with "building, maintaining and administering" the Royal Navy.66 It was also, and unlike the other service ministries, an operational headquarters. At its head was the Board of Admiralty – 'their Lordships' – a body which met roughly once a month under the chairmanship of the First Lord, a government minister. The First Lord was supported for most of our period by two junior ministers, the Civil Lord and the Parliamentary and Financial Secretary, these posts being merged in 1959. Also members of the Board were the Sea Lords, senior serving officers at flag rank headed by the First Sea Lord, the professional head of the Navy. The Second Sea Lord had responsibility for all personnel matters, the Third Sea Lord, also known as the Controller, for materiel, and the Fourth Sea Lord for victualling and logistics. The Fifth Sea Lord, responsible for naval aviation, was a relatively recent innovation. The First Sea Lord was also Chief of the Naval Staff, and assisted in this role by a Vice Chief (VCNS) and a Deputy Chief (DCNS). The latter post, originally Assistant Chief, was merged with that of the Fifth Sea Lord in 1957. Last in protocol but by no means least in power, the Admiralty's senior civil servant, the Permanent Secretary, took the Board's minutes and headed the Secretariat, tasked

65 C Northcote Parkinson, Parkinson's Law, pp.19-22.
66 Naval Staff Handbook BR.1806(48), quoted in Grove, Vanguard to Trident, p.4.
with administrative and budgetary matters and with all official communication on behalf of the Board. The Permanent Secretary derived much of his power and influence from his very permanence: subject neither to election nor to postings at sea, he provided continuity with the passing years. Sir John Lang, Permanent Secretary from 1947 to 1962, outlasted six each of First Lords and First Sea Lords.

Of the Sea Lords, the Controller had the largest empire, including the naval dockyards at home and abroad; the Departments of Naval Construction (DNC) and Naval Ordnance (DNO), each headed by a Director known by the same abbreviation; the Engineer-in-Chief and his staff; the Royal Naval Scientific Service; and the many research establishments. Most of the Controller's staff were based outside London, scattered around the dockyards and shore establishments and at a purpose-built complex near Bath.67 In London, however, and especially in the Admiralty buildings at the northern end of Whitehall - "an ancient monument protected from excessive cleaning or heating by the office of works"68 - the Secretariat and the Naval Staff wielded the most influence. The Staff had been set up, grudgingly, shortly before the First World War, and at least initially its power was limited by the jealousy of flag officers at sea and of the Sea Lords themselves. During the Second World War, however, the Staff came into its own as a source of advice and detailed work on strategy and tactics, intelligence, planning and all other facets of the modern study of war. This policy-making function, as opposed to the policy execution and scientific research carried out elsewhere in the Admiralty, accounted for about five percent of London-based manpower. The internal organisation of the Staff varied considerably over time, but among the figures we shall meet repeatedly were the Director of Plans (D of P), the Director Gunnery Division (DGD), also responsible for guided and nuclear weapons, the Director of Torpedo, Anti-Submarine and Mine Warfare (DTASW), later of Undersurface Warfare (DUSW), the Director of Tactical and Staff Duties (DTSD) who advised on ship requirements, the Director of Air Warfare (DAW) and the Director of Operational Research (DOR). Line management responsibility for these directors was generally shared between VCNS and DCNS, although DOR, being a scientific post, was shared with the Controller. Not a member of the Naval Staff, but a civil servant working closely alongside, was the Head of M or Military Branch (H of M), a post later divided into H of M(I) and H of M(II). Again by virtue of the continuity they offered, Heads of M Branch, including Philip Newell and James Mackay in the 1950s, wielded a good deal of influence in strategic discussions.

A gloomy and stultifying bureaucracy by 1990s standards, the Admiralty was alien and loathsome to most naval officers. For Jervis, at the end of the eighteenth century, Admiralty work was "dull insipid business, fit for Scotch pack-horses."69 Opinions changed little. Caspar John "hated the battle and everything connected with it;" Charles Lambe found everyone "touchy, greedy of power and ready to take instant offence."70 The Admiralty was nevertheless regarded as an

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67 On the Controller's empire, see Lyon, 'The relations between the Admiralty and private industry' in Ranft, ed., Technical Change and British Naval Policy, pp.37-64.

68 Till, Air Power and the Royal Navy, p.126.

69 Quoted in Rodger, The Admiralty, p.84.

70 John, Caspar John, p.202; Warner, Admiral of the Fleet, p.98.
effective organisation by most outsiders. Its business, from around 10am to 6pm, revolved around telegrams arriving from around the world and internal documents held in folders or dockets. "The continued perusal of dockets, telegrams and reports dealing with a wide variety of subjects acts like a drug," recorded one participant: "it dulls the perceptive faculties and paralyses power of criticism and selection behind a deceptive facade of hard work." The average time taken by a docket to complete its circulation, noted another facetiously, was "according to my calculations, two years and six months. This you will note is slightly longer than the time spent by a naval officer in an Admiralty appointment" – the implication being that no new idea or contribution would ever again be seen by the originator. The strength of the Admiralty lay perhaps however in its civilian staff, trained not for practical action but for precisely the kind of paper-chase that Whitehall life entailed. Their strengths were in elegant and economical drafting, not in handling men or warships under stress, and they remained at their desks for longer than the magical two and a half years. They also however, outsiders thought, enjoyed a happier relationship with the officers of their service than did their War Office and Air Ministry counterparts. For all this, the Admiralty undoubtedly shared the weaknesses of the postwar British civil service as a whole. In particular, it was an extremely reactive organisation. Some railed against this; to one junior minister, for example, the coal crisis of 1947 was:

one more illustration of the fact that our governmental system in Britain never thinks ahead. All through the war, every Minister and every senior official was taken up with the crisis of the moment ... just the same since the war, demobilisation, bricks, slates, baths, India, Palestine, Egypt, development areas, bread, timber, etc., etc. Always thinking hard about to-day, sometimes about to-morrow, never about next year.

Many, on the other hand, found the lack of any requirement for original thought comforting. The great majority of business could be "taken up with considered responses" – there was "relief" at somebody else's taking the initiative – at last "solid facts to work on." Such attitudes stare out of the pages of many official documents of the period: discomfort with new ideas, a preference for 'wait and see,' gradual acceptance of initiatives if and when established by senior or political decision, much referral to committees, much consultation, much anxiety to involve everyone with an interest. This last consideration must account for much of the delay and frustration inherent in the process.

72 K G B Dewar, quoted in Rodger, The Admiralty, p.150.
74 Hilary Marquand, Parliamentary Secretary for Overseas Trade, in 1947; quoted in Robertson, The Bleak Midwinter, p.82. On the weaknesses of the civil service, see also Hennessy, Never Again, pp.379-80 and Barnett, The Lost Victory, pp.190ff.
Outside the Admiralty, a number of other bureaucratic players require a brief introduction. The Royal Air Force will be more important to the story than the Army, and is treated separately below. The Ministry of Defence, originally a toothless organisation, loomed larger and larger as the years went by in determining issues of nuclear, and later also naval, policy. This growth has been recounted in detail elsewhere, and only a few short comments are necessary here.\textsuperscript{76} The Chiefs of Staff Committee, comprising the First Sea Lord and his counterparts the Chief of the Imperial General Staff (CIGS) and the Chief of the Air Staff (CAS), was set up in the interwar period to coordinate defence policy advice to ministers, although in the face of inter-service disagreements it often failed to achieve this in practice. It controlled the work of an inter-service Joint Planning Staff (JPS), headed by D of P and his equivalents, and later other bodies including an OAW Committee, on the operational use of atomic weapons, and a Joint Global War Committee, studying nuclear strategy.

The dependence of the Chiefs on their own services led to repeated efforts to strengthen the hand of the Minister of Defence. From the beginning of our period he had access to an independent Chief Scientific Adviser, who chaired a Defence Research Policy Committee (DRPC) to coordinate and prioritise work on new technologies. In 1958 the Minister became clearly superior to his single-service colleagues, including the First Lord, who lost their cabinet rank. At the same time, the Chiefs were given an ‘independent’ chairman, the Chief of Defence Staff. The post rotated between the three services, whose own Chiefs retained the right to offer their opinions to the Cabinet Defence Committee separately. The central staffing of the Ministry was also repeatedly increased. In 1964, revolutionary change followed. The single-service ministries were abolished altogether, the Board of Admiralty became the Admiralty Board of the Ministry of Defence and the leading players, civilians and servicemen alike, began to move to the neutral and monolithic MoD ‘Main Building.’ From this date it becomes harder to discern an independent naval strand of thought in policy discussions, although Navy retains its individual character to this day. I shall return briefly in the conclusion to the real effect of the various defence reorganisations of the postwar period and the changing location of real decision-making power, but the reader will meanwhile note a subtle and gradual shift in focus during the course of the work, away from documents of the Chiefs and the JPS and towards the MoD, the Chief Scientific Adviser and central civilian-controlled bodies like the British Nuclear Deterrent Study Group of 1959-60. Other ministries and government bodies will appear periodically, including: the Ministry of Supply, later of Aviation, which bore responsibility for military and naval procurement and liaison with industry until its merger with the MoD in 1964, and through which the Admiralty had to deal on guided and nuclear weapons issues; the UK Atomic Energy Authority, which bore responsibility for the civil nuclear programme and the production of fissile material for nuclear weapons; its semi-independent offshoot the Atomic Weapons Research Establishment at Aldermaston, which designed and built the weapons themselves;

and the Home Office and Ministry of Transport, which bore responsibility for various aspects of civil defence. Overseas bureaucratic players, including NATO and US Navy leaders, will be introduced as they appear.

Twentieth-century experience

It is difficult to know where to begin an account of British naval history. The reader should certainly not start here. What follows does not pretend to be a comprehensive or even balanced account, but a picture of the subject which would have looked familiar to the characters in this story. Many of its interpretations have been challenged in more recent years. The British were not the world’s first great seafaring nation, but they were quick learners. Beaten to America by the Vikings, perhaps by Basque fishermen, certainly by the Imperial Spanish; beaten to the Indies by the Portuguese and Dutch; the British nevertheless established during the eighteenth century an extraordinary mastery of the world’s oceans which lasted, despite occasional challenges from the French, until the First World War. As I have argued already, this mastery was of more than just antiquarian interest to the men who made Britain’s naval and nuclear policy in the postwar period. The exploits of Drake, Hawkins, Anson, Vernon, Howe, Jervis, Nelson and numerous other fighting admirals, as well as peaceful seafarers like Cook, Ross, Beaufort and Flinders, and less savoury figures like Bligh, were a mainstay of naval, and indeed of all historical education in the British Empire. Nelson in particular gazed sternly but fairly down from the walls of many a wardroom and many an Admiralty office, and over the shoulders of the occupants. British naval might seemed natural to these men, and indeed the prevailing view was that naval strength lay at the root of Britain’s greatness.

The Royal Navy’s golden age in the sunshine of the Mediterranean, the Caribbean and the East had been interrupted however at the start of the twentieth century by the challenge of an upstart power in the grey waters of the North Sea. Various explanations of the rise of the Anglo-German antagonism are possible; its clearest expression was in a battleship building race. This was championed by Tirpitz, Navy Minister in Germany from 1897, and by Jackie Fisher, First Sea Lord from 1904 and, although a controversial figure, undoubtedly the father of the modern Royal Navy. Tirpitz was originally no Anglophobe; bizarrely, he sent his daughter to Cheltenham Ladies College. But his aggressive naval programme set Germany on a collision course with the status quo power. Fisher put an end to the Victorian fetish for gleaming brightworks as the sole expression of naval power, began to refine gunnery through serious exercising and redeployed the Royal Navy

Hill, ed., The Oxford Illustrated History of the Royal Navy, is the best written and most authoritative recent introduction to British naval history. Other important works, without which the following account could not have been written, include Marder, The Anatomy of British Sea Power 1880-1905, and From the Dreadnought to Scapa Flow (5 vols); Schurman, The Education of a Navy; Roskill, Naval Policy Between the Wars (2 vols); Kennedy, The Rise and Fall of British Naval Mastery; Till, Air Power and the Royal Navy 1914-45; and Ranft, ed., Technical Change and British Naval Policy 1860-1939.

Kennedy, in The Rise and Fall of British Naval Mastery, believes that naval power was a symptom, not a cause of British greatness, and he is undoubtedly right. But most of the characters in my story would have regarded his views as sophistry.
closer to home waters in 1904-05. He also laid down revolutionary new warships — Dreadnoughts and battlecruisers — against which naval power was to be measured in future. He resisted some ideas, notably the setting up of the Naval Staff, and engaged in personal battles which created quite some legacy of bitterness. Modern scholarship, especially that of Jon Sumida and Nicholas Lambert, has emphasised the Admiralty’s — and Fisher’s — thinking on imperial defence, flotilla warfare, submarines and armoured cruisers over the Mahanian battlefleet in the North Sea.79

These conclusions, whilst interesting, are less relevant to my exploration of thinking in the early postwar period, when most would have agreed that Fisher’s gunnery and battleship modernisations were his greatest achievement, and came, furthermore, not a moment too soon. By 1914 Tirpitz was clear: “England, with brutal egoism, recognises only Englishmen. Niggers and Germans are on the same level to them. Never has the world been so terrorised as by this pirate-people on their island.”80

When war came, the Royal Navy expected a single fleet battle to sweep the Germans from the seas. Instead, a waiting game developed and the Navy’s part in the Great War was to be far less glorious than it had hoped. Rather than putting to sea in line ahead, the Germans engaged in hit-and-run tactics, occasionally shelling British east coast ports, lurking in the mine-infested waters of the Heligoland Bight and pinning their hopes on a guerre de course against Britain’s seaborne trade. An unexpected weapon, the U-boat, caused enormous damage and by 1917 genuinely threatened Britain’s survival. Only the resumption of research into anti-submarine warfare, which had actually been stopped on the outbreak of war, and the adoption of a convoy system by the reluctant Admiralty, saved the day. Convoy, the sailing of merchant ships in company, with or without an armed escort, continued to cause controversy throughout our period and it is worth digressing for a moment to explore the reasons for its unpopularity. First, it was difficult: it required an unfamiliar degree of cooperation with the Merchant Navy, and caused peaks and troughs in cargo handling in ports. It also led inevitably to slow speeds, ships being limited to the speed of the slowest amongst them, almost always less than 10kt. Second, it required escorts which many thought were better employed protecting the fleet itself. Third, and most important, it was unglamorous and — dread word! — defensive. There remained a temperamental aversion to sailing at 8kt in company with a motley collection of merchantmen and waiting for something to happen. Although the empirical evidence always supported the idea of convoy, neither during the Great War, nor for many years after, was this both gathered together for rigorous study and presented to a wide audience. The lesson that anti-submarine warfare, and not the clash of battlefleets, threatened to become the decisive mode of war at sea was entirely lost on the Admiralty at this stage. Attention focussed instead on the inconclusive Battle of Jutland in May 1916, the one ‘proper’ naval action of the war, when the bashful High Seas Fleet finally sallied forth and met the British Grand Fleet, inflicting heavy losses before escaping in smoke and twilight when the action threatened to reach a climax. The Royal Navy was left in


80 Quoted in Kennedy, The Rise of the Anglo-German Antagonism, p.462.
possession of the battlefield, but British dissatisfaction was reflected in years of soul-searching over the lost opportunity to inflict a decisive defeat. Technical deficiencies in gunnery, armour protection, damage control and communications were sought out and rectified. Tactical discussions, especially on the role of the Admiralty in London vis-à-vis the commander on the spot, proliferated. Jutland ought really to be no more than a footnote, but such a judgement is, for the present purpose, unhistorical. The battle continued – indeed still continues – to fascinate naval historians. This fascination served only to reinforce the battlefleet obsession, in Britain and abroad, as well as fuelling a generation and more of personal backbiting over the actions of those involved in the battle.

After the Great War, the Royal Navy returned to a routine of imperial policing: in the Aegean, in the Wars of Intervention in Russia, in the Far East, and eventually in the Spanish Civil War. It was also forced to accept an unwelcome parity with another upstart at sea, the US Navy. Throwing its weight decisively into the balance late in the war, the US had emerged not merely victorious but, suddenly, a world power both economically and militarily. This status was symbolised by President Wilson’s key role as a peacemaker in Europe, and later by disarmament negotiations which, at Washington in 1922, pegged the British and American navies at equal tonnages of capital ships. The Americans also insisted on an end to Britain’s friendship in the Far East with Japan; this left the Admiralty uncomfortably aware that, unlike in 1904-05, Britain would be unable in future to concentrate the Navy in European waters without fear of trouble elsewhere. The spectre of war on two or even three fronts – against Germany in the North Sea, Italy in the Mediterranean and Japan in the Far East – came to haunt the interwar Navy. A number of significant problems resulted. First, naval base facilities in the East required improvement if a genuine prospect of war in that theatre had to be faced – hence the Admiralty’s interwar obsession with Singapore. Second, imperial defence became an urgent requirement. Ultimately this became a euphemism for getting the dominions and colonies to contribute to their own upkeep, but little progress was achieved beyond the addition of a few major warships to the fleet. Third, the Admiralty became closely associated with the policy later known as appeasement. Appeasement was in fact a perfectly rational response to interwar realities. Britain was prevented by disarmament commitments and financial weakness from responding aggressively to the naval and colonial ambitions, in particular, of Italy and Japan. Concessions were therefore logical. As First Sea Lord Chatfield put it, “We have to stand more or less alone and unsupported in both hemispheres... An understanding with Japan... [is] the first essential... [to] rid ourselves of any League responsibilities which might involve us in a war.” Furthermore “it is a disaster that our statesmen have got us into this quarrel with Italy, who ought to be our best friend because her position in the Mediterranean is a dominant one.”

Unfortunately appeasement, whilst achieving the aim of relatively cordial relations with Italy and Japan, served only to encourage Hitler and therefore gained a bad

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81 See the recent Campbell, Jutland: An Analysis of the Fighting, and Gordon, The Rules of the Game: Jutland and British Naval Command.

name. With postwar hindsight, the Admiralty’s reputation suffered somewhat as a result.

At home, the inglorious episodes of the ‘Geddes Axe’ of officer manpower and the Invergordon Mutiny added to the impression of gloom. Nevertheless the Royal Navy remained a powerful fighting force, and although a certain conservatism is apparent in tactical studies, serious and sensible efforts were made to prepare for war as the 1930s wore on. Battlefleet tactics were refined in Britain, as in other countries. More mundane matters also received attention. A convoy policy was tentatively recommended in 1937; a Shipping Defence Advisory Committee was set up to link the Admiralty, the Board of Trade, Lloyd’s and shipowners; and arrangements for the control of shipping were reviewed, a war manual eventually appearing. Air attack on British ports was confidently expected, and studies began of the problems this would create for shipping and inland transport, although “when the port problem was for the first time seriously tackled its ramifications seemed without limit.” The major weakness in planning for the defence of shipping was, oddly, the very problem that had almost lost the war at sea in 1917: the submarine. The Admiralty led serious calls internationally between the wars to outlaw submarines altogether, but a 1922 Treaty Relating to the Use of Submarines and Noxious Gases in Warfare did not enter into force, and all that could be achieved was an article in the 1930 London Treaty, restated in 1936, requiring submarines to ensure the safety of the crews of merchant vessels before sinking them. This provision, which looks rather ridiculous in retrospect, served alongside technical developments including the success of asdic to give the Admiralty confidence that the unrestricted submarine warfare of 1917 would not be repeated. To be fair, the Germans also underestimated the future potential of the submarine, and U-boat construction only recommenced in earnest in 1938-39, but anti-submarine warfare “could scarcely have had a lower profile” in the interwar Navy. The Combined Fleet exercises of March 1939 culminated in a fleet action: “truly the memories of Jutland died hard; and if much of the thought put into Trade Defence ... was soundly based it did not penetrate far into the training of our main fleets.”

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83 See Till’s account of battlefleet tactics in ‘Retrenchment, Rethinking, Revival 1919-39’ in Hill, ed., The Oxford Illustrated History of the Royal Navy, pp.343-7. Till makes the point that the Navy was positively not preparing to fight the Battle of Jutland again, but even as counterpoint that episode still dominated British thinking.


87 Roskill, Naval Policy Between the Wars, Vol.2 p.431.
The Second World War

On 3 September 1939, Britain declared war on Germany a second time. A grim struggle ensued, perhaps especially at sea where hostilities were uninterrupted for nearly six years. Along the way, the Royal Navy suffered a number of humiliating setbacks. Norway was lost in a matter of weeks in 1940, the Navy too late to intercept Hitler’s invasion fleet and too vulnerable to air attack to sustain the toehold at Narvik. The battleship Royal Oak was torpedoed and sunk at her moorings in Scapa Flow; the Valiant and Queen Elizabeth were badly damaged by Italian frogmen in Alexandria. Crete was abandoned, the Navy once again powerless in the face of the Luftwaffe. The Prince of Wales and Repulse, a pathetic reinforcement for the Far East, were overwhelmed by Japanese air attack, and Singapore, centrepiece of the Admiralty’s interwar strategy for the Far East, was lost in 1942. The Japanese penetrated far into the Indian Ocean and Admiral Somerville, C-in-C Eastern Fleet, had to play an embarrassing game of hide and seek, unable to risk his ships in battle. In the final battles against Japan in 1945, the British Pacific Fleet was reduced to the status of a ‘task force’ of the US Navy. Pride in the British armoured carriers’ resistance to kamikaze air attack was no substitute for real power. Admiral King, the US Chief of Naval Operations (CNO), did not bother to hide his contempt for the British.

More successful, but no less grim, was the Battle of the Atlantic. Given the high fliers’ disregard for trade defence work, responsibility for this, the single most important battle to Britain’s survival, largely devolved upon the Royal Naval Reserve (RNR), Royal Naval Volunteer Reserve (RNVR), ‘hostilities only’ conscripts and the Merchant Navy. The RNR were professional seafarers – many of them trawlermen who “possessed that truculent independence, robustness of speech and disrespect of dignity which is the hallmark of those who handle fish.” The RNVR were civilians without, necessarily, any seagoing experience. Among the regular officers involved alongside these reservists, there were “many failures from Scapa Flow, many retired officers and many incompetents.” Control of the battle was exercised by the Western Approaches Command under Admirals Percy Noble and later Max Horton, not from London but from Derby House in Liverpool, where “it seemed that by design or accident all the misfits of the Navy had congregated.” A similar group of misfits at Bletchley Park broke German naval ciphers at important stages of the battle. This Fred Kamo’s Navy nevertheless masterminded an epic victory, improvising anti-submarine tactics and weapons, shepherding their merchant charges in convoy in all weathers and collaborating with the civil authorities in the complex task of control of shipping.

This unspectacular work, the convoy battles numbered rather than named, underpinned the British war effort and, famously, if it could not guarantee victory, it at least prevented defeat. Many aspects of the Atlantic battle continued to resonate through the postwar period. Convoy, though in fact vindicated by experience,
remained controversial. Restless regular officers and Whitehall strategists continued
to chafe at the ‘defensive’ and to suggest alternatives. ‘Transit offensives’ – sweeps
by surface warships or aircraft through waters used by U-boats to reach their patrol
areas – had been tried during the Spanish Civil War by Admiral Dudley Pound, then
C-in-C Mediterranean but now First Sea Lord. They were now endorsed
enthusiastically by Churchill and by RAF Coastal Command, most of whose aircraft
lacked the range for convoy escort work. ‘Attack at source’ on the bases and
building yards sustaining the U-boat offensive was also repeatedly used, without
significant success. Debates on these subjects would resurface after the war, even
after the Naval Staff History had laboriously demonstrated that:

Convoy escorts, air and surface, determined the outcome of the anti-submarine
war. Not only did they save the most ships from destruction but they destroyed
the most U-boats. When their strength, organisation and equipment had been
built up and above all the personnel had reached a high degree of skill, they
achieved the one certain prelude to victory, they broke the enemy’s will to attack
decisively at the decisive point, the convoys.91

Matching the dogged and unspectacular work of the Western Approaches
Command were the staff of Combined Operations. Like trade defence, the subject
was far from the top of the prewar Royal Navy’s agenda. With able and imaginative
champions however in Churchill and Mountbatten, and the spur of necessity – a
second front meant a need to land unprecedented numbers of troops and heavy
weapons on the continent – Combined Operations rose to the challenge and made a
huge contribution to victory. Admiral Bertram Ramsay, who worked tirelessly to
oversee the preparations for the Normandy landings, complained that “service in
Combined Operations is, unhappily, still regarded by many of the best naval officers
as a sideshow,” but his seven hundred foolscap pages of orders for Operation
Overlord were “a never surpassed masterpiece of planning.”92

The war was a truly formative and shattering experience for most who
fought. “Almost non-stop from the beginning to the end of the war the sailor, from
boy to admiral, was in danger.”93 This was bound to take its toll, especially when
added to the responsibility of command. In May 1941, during the battle for Crete,
Admiral Sir Andrew Cunningham, C-in-C Mediterranean, reached rock bottom:

Dickie [Mountbatten] asked ABC [Cunningham] if he could see him alone
before he left Alexandria. ABC’s nephew-in-law, Starkie, was killed in the
Juno, and this, together with the awful sight of the badly wounded in HMS
Maine . . . had rather shaken him, Dickie thought. Dickie asked him what his
real feelings were. He said: ‘I don’t want this repeated but I feel like going out

91 Naval Staff History, The Defeat of the Enemy Attack upon Shipping, ed. & intro. Grove,
Navy Records Society, pp.94-5. One American writer recalls that this work “settled the
matter” (Tritten, in idem and Dandolo, eds., A Doctrine Reader, p.29), but the sceptics
surfaced again in the 1980s with the US Navy’s forward maritime strategy.

92 Barnett, Engage the Enemy More Closely, pp.545, 780 and ch.25.

93 Kenneth Poolman, quoted in Wells, The Royal Navy: An Illustrated Social History,
p.168.
in a destroyer into the thickest of the bombing and getting killed or else resigning.  

And yet the trauma could be matched with elation. Only two months previously Cunningham had had the satisfaction of sinking five Italian ships in the textbook surface action of Matapan. Here was life lived to the full:

In a silence that could almost be felt one heard the voices of control personnel putting the guns on to the new target. Never in my whole life have I experienced a more thrilling moment than when I heard a calm voice from the director tower ‘Director layer - target,’ sure sign that the guns were ready and that his finger was itching on the trigger... The Italians were quite unprepared. Their guns were trained fore and aft.

To regard the backroom boys as the real masterminds and heroes of the war at sea, as some now do, is, at least for the present purpose, to miss the point rather. At the time, and for many years after the war, the big ship sailors – Cunningham above all – were generally hailed by press, public and regular officers and men as the victors. Such success as they achieved – at Matapan, with the sinking of the Graf Spee, the Bismarck and the Scharnhorst, the raid on Taranto – underpinned the postwar image of the Navy just as much as the convoys or combined operations. The postwar generation of senior naval officers all had ‘good wars,’ and all came from big ships. Peter Gretton, a convoy escort commander who briefly became DCNS in 1962-63, was almost the only exception. Senior officers associated with Cunningham in the Mediterranean were particularly conspicuous in the postwar corridors of power. Of those present at Matapan, for example, the fleet gunnery officer, Geoffrey Barnard, later became DCNS; Cunningham’s Chief of Staff, John Edelsten, became VCNS then C-in-C Mediterranean; and Varyl Begg, gunnery officer of the flagship HMS Warspite, became First Sea Lord. This is evidence not of nepotism but of the continued importance to an officer’s career of service in capital ships. Men who received such appointments and fought true to the offensive spirit of Drake, Nelson and now Cunningham, received preferment. Ramsay, for example, did not: as he remarked of Cunningham, “he is one of the ‘true blue’ school and I suppose I am not.”

In the years following the war, the true blue history of the Navy prevailed. Quite small victories, even defeats, became glorious. Corelli Barnett, applying a cool strategic logic, has described Malta as “the Verdun of maritime war,” deriding Churchill’s Mediterranean strategy but recognising at the same time the symbolic importance of the fighting spirit displayed there to the British war effort, and to postwar myth-making. Malta was awarded the George Cross, Britain’s highest

94 Recorded by Charles Lambe, and quoted in Warner, Admiral of the Fleet, p.101 (Mountbatten’s memory could be selective, and he never saw exactly eye to eye with Cunningham; the anecdote may not be entirely accurate, but it will serve to represent the feelings of many at a dreadful time for the Navy).

95 This time in his own words: Cunningham, A Sailor’s Odyssey, p.332.

96 Ramsay in 1943, quoted in Barnett, Engage the Enemy more Closely, p.630.

97 Barnett, Engage the Enemy more Closely, p.491 and ch.16.
award for civilian gallantry, in 1942. Its story is only one of many which still serve
to define the Second World War in British minds. In the immediate postwar period
with which this study is concerned, and before the elegaic or even mocking
examination of British decline became the chief preoccupation of historians, this
kind of myth was centrally important to the British population. Britain had beaten
Germany, and took a great deal of satisfaction from having done so. This
satisfaction took a number of forms. For some, the myth of the blitz and of
‘muddling through,’ with which we can perhaps couple the Battle of the Atlantic,
struck a chord. For the establishment, and here the majority of naval officers can
certainly be included, the offensive feats of British arms were more important. This
goes far towards explaining why, in the aftermath of victory, the scaling back of
British military preparedness, the abandonment of imperial commitments and of
strategies that had served well, were unthinkable and unthought. The interwar
period now looked like a discontinuity, a period of cynicism, lethargy and weakness.
Britain was a nation revindicated.98

This satisfaction lasted for many years in naval historiography. The lesson
was drawn that a maritime strategy had once again served Britain well: a long
period of marshalling British strength, including especially the pursuit of command
at sea through tactical offensive action and through convoy, had been succeeded by
a well-timed strategic offensive, applying military and naval power at the critical
point and ensuring final victory. Richmond and the official historian, Stephen
Roskill, were the chief publicists of this ‘Dunkirk and D-Day’ maritime strategy.99
A few episodes, notably the disastrous abandonment of convoy PQ 17, were
recognised as outright defeats, but the war as a whole had been conducted very
successfully; there was none of the post-Jutland soul-searching. Only later was any
significant controversy encountered, for example over Churchill’s interference in the
detailed management of the war at sea, and at a more academic level over the
relative merits of the maritime and continental schools.100

It is possible to argue nevertheless that the experience of the Second World
War had brought about significant changes in naval thought. Although the big ship
sailors took much of the credit, the Battle of the Atlantic had clearly been of great
importance, and the lesson that trade protection had become a vital naval role was
far more readily accepted in 1945 than in 1918. As we shall see in chapters one and
two, naval officers and strategists restated this new orthodoxy firmly and frequently
in the ten years after the war. The big ship sailors themselves had also become a
more adaptable breed. Fleet cruisers and destroyers had been pressed into service
on the Malta convoys; task groups like ‘Force H’ in the Mediterranean, rather than
battlefleets, had become de facto the Navy’s major operational groupings; aircraft

98 See the important works of Calder, The Myth of the Blitz; and Blackwell, Clinging to
Grandeur.
99 Roskill, The War at Sea, Vol.1, ch.1, and The Navy at War; Richmond, Statesmen and
Sea Power, ch.9; also, under the influence of the latter, Dickens, Bombing and Strategy.
100 See Roskill, Churchill and the Admirals, esp. the appendix taking issue with Arthur
Marder, who was inclined in From the Dardanelles to Oran to be easier on the Prime
Minister especially over the Norwegian campaign. On the maritime and continental, see
esp. Howard, The Continental Commitment; also Strachan’s review article ‘The British
carriers, performing roles as various as convoy protection and air strikes against land targets and ships at sea, had become the Navy's capital ships. Improvisation and flexibility, rather than any Jutland-style programmatic strategy, had won the war. Compared to their First World War predecessors, drilling their guns and their fleet manoeuvres for a battle which never really came, successful officers now had a far greater variety of experience.

The Royal Air Force

I have chosen here to treat separately the relatively short history of naval relations with the Royal Air Force. This is another important theme which needs to be introduced as background to the postwar period and, in particular, to reactions to nuclear weapons. Relations were, unfortunately, nearly always poisonous. This was neither simply naval resentment of glamorous johnnies-come-lately in silk scarves who got much of the credit for winning the war, nor air force misapprehension of the barnacled, boathook-wielding and backward-thinking senior service, although these caricatures hide some truth about service prejudices. There were also concrete points of contention between the two services, ranging from the tactical and administrative to matters of high philosophy.

First and foremost was control over the supply, training and direction of the aircraft and personnel involved in maritime warfare. The Royal Naval Air Service, including personnel and aircraft based on ships at sea, became part of the Royal Air Force on its formation in 1918, most of its members happy to escape the control of the surface navy. The 'Fleet Air Arm of the RAF' was soon formed, subject under the 1924 Trenchard-Keyes agreement to a system of 'dual control' disliked by both services. A career in naval aviation became a poor move for RAF officers, given the new service's other priorities, but also for naval officers, since it meant time away from training in seamanship, specialist skills and leadership. Many senior naval officers deprecated "the general type of officer, socially, in the RAF," 101 and discouraged youngsters from associating with their light-blue cousins. Admiral Tom Phillips may have regretted momentarily the discouragement he had personally been given as his flagship Prince of Wales was sunk by air attack in 1941. Although others, including future First Sea Lord Caspar John, persevered, the net effect was to lessen the influence of aviators in the Admiralty and the impact of the air on strategic thought. Only in 1937 did the Inskip Report recommend the transfer of the Fleet Air Arm to the Navy, and only in 1938 was the Fifth Sea Lord's post created in the Admiralty with responsibility at Board level for aviation. One of the most serious problems of the new naval air arm was the quality of the aircraft previously specified by the Admiralty, which were generally multipurpose and of poor performance compared with the best carrier-based aircraft developed by the Americans and Japanese in the late 1930s.

In fairness, the problems of the interwar Fleet Air Arm cannot be laid entirely at the door of the RAF. Even given control over naval aviation throughout the period and a cadre of experienced naval aviators, the Admiralty would not necessarily have developed the Fleet Air Arm any more energetically than the Air Ministry. The point is rather that the prolonged argument over ownership was in

101 Till, Air Power and the Royal Navy, p.47.
itself pernicious, both for the Fleet Air Arm and for Coastal Command. There was a "tendency to concentrate on ownership rather than purposes"... "if the energy displayed and consumed in the fight for repossession had been devoted to the fullest tactical and strategic development of naval aviation, the Royal Navy would have been much better prepared for the trials of war in 1939."\textsuperscript{102} The very political sensitivity of the issues between the Royal Navy and RAF stifled any careful consideration of the influence of airpower on war at sea. If the RAF at the time, like many commentators since, chose to emphasise the "pigheaded conservatism of an Admiralty obsessed by the power of the battleship," which continued to regard aircraft and carriers as tools of the battlefleet in spotting and slowing down the enemy at sea,\textsuperscript{103} the Navy chose instead to blame the RAF's obsession with strategic bombing for the neglect of naval aviation and the poor relations between the services.

Strategic bombing had been central to the self-image of the RAF long before the war, an article of faith for the service's creator, Lord Trenchard. It appeared to offer a shortcut to victory, its impact on the civilian population justified, in an era of total war, by the need to avoid a repeat of the carnage witnessed a few years previously in the trenches. Until the Second World War, however, strategic bombing was a relatively peripheral problem for the Royal Navy. True, it competed - successfully - for priority over the Fleet Air Arm and Coastal Command, but these were not yet central problems either. True also, it focussed attention on the slightly bizarre and entirely tactical 'bomber versus the battleship' debate, especially in the US where rigged experiments demonstrated the value of this or that tactical point and affected the competition for dollars on Capitol Hill. Only during the darkest days of the Battle of the Atlantic however did the question assume vital importance for the Admiralty. By March 1942, a serious argument had developed in Whitehall over priorities for large, long-range aircraft. Should they be devoted to the bomber offensive against German cities, or to the anti-submarine battle in the North Atlantic? In June, Brind and Slessor, the Admiralty and Air Ministry Directors of Plans, were deputed by the Chiefs to study the question; Churchill ruled subsequently that "in spite of U-boat losses, the Bomber offensive should have first place in our air effort."\textsuperscript{104} The Navy and RAF each continued to argue that the other's preoccupation was a sideshow. Arguments of fact developed, and compromises such as the diversion of air effort to 'transit offensives' and 'attack at source' were explored in needless detail. The real disagreement was now more deep-seated than mere facts however. Air Marshal Harris, AOC-in-C Bomber Command, wrote that the Navy sought "to sever each capillary vein, one by one, when they could, with much less effort, cut the artery." But "the suggestion that operations against U-boats were 'defensive' was always a red rag to the Navy."\textsuperscript{105} The offensive spirit of Drake and Nelson was in question. During the winter and

\textsuperscript{102} ibid., pp.120, 54.

\textsuperscript{103} ibid., p.188; see also Till's account of interwar battlefleet tactics in Hill, ed., The Oxford Illustrated History of the Royal Navy, pp.343-7.


\textsuperscript{105} Quoted in Howard, Grand Strategy Vol.4, p.21; Butler, Grand Strategy Vol.3 Pt. 2, p.536.
The Royal Navy and Nuclear Weapons

spring of 1942-43, an Anti-U-boat War Committee met weekly. New tactics, new weapons and operational research findings made the inter-service discussions in this committee less bitter than during the previous summer, but the question of long-range aircraft remained controversial. Eventually, in spring 1943, a handful of American Liberator aircraft was allocated to plug the ‘air gap’ in the middle of the North Atlantic, but Bomber Command had not conceded the point, and its own aircraft were still devoted to the offensive against Germany. Long-range aircraft, especially in the convoy escort role, eventually made a decisive contribution to the Battle of the Atlantic, as the Naval Staff History demonstrated after the war; but there was less agreement on the decisive effect of the strategic bombing of Germany.

No issue in British military history still causes so much controversy as strategic bombing.106 It remains difficult to treat the subject dispassionately: to erect statues to Harris is to insult the memory of the citizens of Cologne, Hamburg and Dresden, slaughtered in their tens of thousands by Bomber Command; to suggest that Harris would have faced war crimes charges if Britain had lost the war is to insult the memory of his brave aircrew, slaughtered in their thousands by German fighters and anti-aircraft fire. Naval commentators during our period saw no need to be even-handed however. Again and again postwar writers – not just naval writers, but even the official historians – bemoaned the priority ‘wrongly’ given to strategic bombing:

Where so many of the relevant factors are hypothetical, opinions on the correctness of our air policy in 1942 will continue to differ, but it is difficult not to agree with those who believed that in the shipping emergency of that year increased assistance to the war at sea would have been worth a slight reduction in the strength of the strategic air offensive.107

The effectiveness of the defence of shipping was so greatly increased in 1943 when, eventually, after long delay . . . additions had been made to the air forces at sea, that it is legitimate to conclude that, if this had been done sooner at the cost of reducing the volume of the attacks on the German cities, that most grievous loss of 3520 British merchantmen, of a value of £230 million, would not have been suffered, and that many cargoes of badly needed war material . . . would have reached the fighting forces: while the bottleneck of shipping, from which the military operations in all the theatres suffered throughout the war, would not have been so constricted nor the world recovery after the war . . . so impeded.108

Maybe Portal [Chief of the Air Staff] lacked sympathy with the navy and did not fully appreciate the Battle of the Atlantic. Thus he wrote of the Naval Staff, ‘They were entirely defensive in their thinking, being haunted by the thought that if sea communications were severed we must lose the war.’ Evidently Portal

did not realise that the successful passage of a convoy was a greater victory than unsuccessful bomber raids on Germany.\textsuperscript{109}

Had the RAF deserted the Navy in its hour of need? The appeal to Churchill of the one positive means he had of hurting Germany, and the importance of this hurt to British morale during the war, should not be underestimated. But most naval commentators conceived a violent opposition to "murder bombing"... "no more disastrous policy could possibly have been adopted."\textsuperscript{110} The acid wit of Corelli Barnett gives elegant expression to these feelings. He quotes Harris, in a letter "dripping with the adrenalin of the 1000-bomber raid on Cologne": Coastal Command was "merely an obstacle to victory" and the Atlantic campaign "vastly protracted and avoidable." Harris was, he comments, "blessed with a stubborn will, high executive ability and outstanding powers of leadership. But he was so afflicted by mental tunnel vision that in regard to the wider scene of grand strategy it is fair to apply to him the epithet 'stupid'."\textsuperscript{111} Thus the prologue to that final culmination of the strategic bombing campaign, the atomic weapon – developed in secret in the peace of the New Mexico desert whilst the Royal Navy fought and won the bloodiest war in its history.

\textsuperscript{109} A J P Taylor, ‘Strong Silent Man,’ in From the Boer War to the Cold War: Essays on Twentieth Century Europe, p.376.


\textsuperscript{111} Barnett, Engage the Enemy More Closely, p.469.
The big ship navy

When the Royal Mail produced a series of postage stamps on naval history in 1982, Fisher and Cunningham were chosen to represent the twentieth century. The true blue history of the Navy retains its hold in the UK (p.27).
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Summary of escorts in company at some time:
- 7 Destroyers
- 8 Convoyers
- 1 AMC
- 2 Trawlers

GRT is indicated in brackets.

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**Fig.2: Convoy**

Although the empirical evidence always supported the idea of convoy, most regular officers retained a temperamental aversion to sailing at 8kt in company with a motley collection of merchantmen and waiting for something to happen (p.22).
Fig. 3: Emergency Port

Measures to handle imports into the UK during a strategic air campaign were examined in the 1930s, and an emergency port operated in the Clyde during the war. The subject was raised again in the 1950s. "When the port problem was for the first time seriously tackled its ramifications seemed without limit" (pp. 24, 70-3; Behrens, *Merchant Shipping and the Demands of War*).
No issue in British military history still causes so much controversy as strategic bombing. Harris led Bomber Command during the war and repeatedly dismissed the demands of the Battle of the Atlantic. Naval commentators during our period saw no need to be even-handed in their analysis of Harris and his contribution (p.31).
Chapter 1: First Thoughts

The Royal Navy and Nuclear Weapons

Bedevere: We have the Holy Hand Grenade.
Arthur: Yes of course, the Holy Hand Grenade of Antioch. 'Tis one of the sacred relics Brother Maynard carries with him . . . How does it . . . er . . . how does it work?
Lancelot: I know not my liege.

(Monty Python and the Holy Grail)

Three atomic explosions, at Alamogordo in New Mexico on 16 July and over Hiroshima and Nagasaki on 6 and 9 August 1945, ushered in the nuclear age. The new weapon, thousands of times more powerful than existing explosives, was quickly hailed as revolutionary - "The most terrifying weapon in history," said the Daily Mail, whose science correspondent foresaw "the end of war itself. No war potential could stand up for a week against the sort of bombing which is now a possibility . . . The Labour government need not waste time nationalising the coal industry, nor the electric and gas industries since these industries are from now on obsolete."1 Such apocalyptic reactions were commonplace in the first nervous days of the peace.2 This chapter seeks to explore the immediate thoughts and reactions of the Royal Navy in the early months and years of the atomic age. Some context is necessary for these thoughts, and I have included a short summary of defence planning issues before moving on to look at the extent of the Navy's knowledge of the bomb and its physical effects, at the perceived implications for the Navy's defensive and offensive operations in a war at sea, and finally at a significant early exercise and the thoughts that it provoked.

Defence planning issues

A bewildering array of issues faced defence planners in the UK. The postwar world political situation had preoccupied a small group of officials in the Foreign Office and the service ministries as early as 1942. As it became clear after the war that fundamental differences between the wartime allies were likely to poison relations permanently, these planners turned with increasing concern to the problems of a possible war with the USSR. Meanwhile there were serious imperial troubles in Palestine and India. The reconstruction of Europe and the welcome involvement of the United States later added another dimension to defence planning as strategic discussions began with various allies. Britain's finances lurched from one crisis to the next: the end of Lend-Lease, the American loan, convertibility, devaluation. As a result the defence debate was crucially constrained by financial realities; we had,

1 Daily Mail, 7 Aug 1945, front page headline and John Langdon-Davies on p.2.
2 See Boyer, By the Bomb's Early Light, for a study of public reactions in the US.
as in the interwar period, to cut our coat according to our cloth. These factors, together with technological developments including - but not, as we shall see, limited to - the atomic bomb, provided the impetus for constant reviews of Britain’s strategy and the size and shape of the armed forces she required. This is not the place for a detailed account of the ferment in defence thinking in the late 1940s. A brief look at a small number of themes, however, including strategic bombing, deterrence, the continental commitment and the search for allies, will form a useful background to consideration of naval thought.

As I have tried to establish in the introduction, strategic bombing was by no means a new theme in 1945. Wartime arguments on the effectiveness or otherwise of the strategic bomber offensive continued to rage. The Navy was always on the side of the sceptics: thus Sir John Cunningham as First Sea Lord wondered aloud whether “it is a safe assumption that a world power can be knocked out of a war by the exercise of air power alone . . . history has, so far, by a narrow margin, disproved this assumption.” Hulme (DNOR) claimed in 1945 that, on the basis of five tons of bombs dropped to kill one German, and four man years of British effort to drop one ton of bombs, it had taken twenty man years, or four men working throughout the war, to kill every German by strategic bombing: “not a very decisive way to kill the enemy.” Inspired by Richmond, Admiral Sir Gerald Dickens published a polemic against the air offensive strategy in 1946. Nevertheless by April 1946 the Chiefs were using the air offensive as a justification for the retention of bases in the Middle East in the face of opposition from Attlee, and by the early part of 1947 strategic bombing was an accepted feature of all plans for a war against the Soviet Union.

Along with the centrality of the air offensive came the idea of deterrence. This was not a new idea in 1945 either, but as Clark and Wheeler have shown it grew to maturity in the immediate postwar years and gained a specifically British following and British flavour based on the perceived vulnerability of the UK, a small and densely populated island, to atomic bombing. At the highest level of defence

3 Foreign Secretary Ernest Bevin, quoted in Grove, Vanguard to Trident, p.8; see also Gorst’s article in Aldrich, ed., British Intelligence, Strategy and the Cold War.

4 Lewis, Changing Direction, is a highly readable account of the rise of the Soviet threat through British military eyes; Deighton, The Impossible Peace and Cornish, British Military Planning for the Postwar Defence of Germany, detail the moves towards an unprecedented peacetime continental commitment; Bullock, Ernest Bevin: Foreign Secretary; Deighton, ed., Britain and the First Cold War and Dockrill and Young, eds., British Foreign Policy 1945-56, contain wider background.

5 PRO, COS(47)78 of 14 Apr 1947 in DEFE 5/4; COS(48)137(O) of 17 Jun 1948 in DEFE 5/11.

6 PRO, memo of 4 Sep 1945 in ADM 1/17259, quoted in Lewis, Changing Direction, p.196 (Hulme correctly noted that the atomic bomb had been rather cheaper in these terms).

7 Dickens, Bombing and Strategy: The Fallacy of Total War.


planning—the Chiefs, ministers and Attlee himself—the threat of retaliation was very quickly seized upon as the only possible basis for the prevention of atomic attack. It should be emphasised at this point however that although the defence planners quite clearly regarded an air offensive as an essential part of a future war against the USSR, they were not at first certain that it would immediately involve weapons of mass destruction; a period of what would later be called intra-war deterrence was a possibility. Some documents of the period related to immediate planning for a time when neither the UK nor the USSR would possess any atomic bombs. Even those that were tied to a more distant future did not initially assume the immediate use of weapons of mass destruction. In March 1947 the JPS suggested that “should substantial stocks of atomic bombs be available to both sides . . . we can foresee circumstances in which there might be great reluctance to initiate atomic warfare.”¹⁰ Nor should it be assumed that the phrase ‘weapons of mass destruction’ refers solely to atomic bombs; the same document makes it clear that biological and chemical weapons were also being considered, though without the benefit of such a firm basis of practical knowledge. In April 1948 the JPS and Joint Intelligence Committee (JIC) prepared a joint report on the likely strategic context of a war in 1957, as a discussion paper for staff talks with the Americans, which again left open the question of whether atomic weapons would be used at the outset:

Our conclusions regarding the use of weapons of mass destruction . . . are:
(a) Weapons of mass destruction may be used from the outset by either side, in which case the other side will have resort to them.
(b) Russia may not use weapons of mass destruction at the beginning of a war, and in that case it may be politically impossible for the allies to use them.
(c) However, if weapons of mass destruction are not used at the start, the allies might initiate their use at a later stage when
   (i) the UK was hard pressed by attack with conventional means
   (ii) the war had reached a stalemate by conventional means and the allies wished to press it to a decisive conclusion.
(d) Similarly the Russians might initiate the use of weapons of mass destruction at any time they think it might be to their advantage to do so.¹¹

Only during the course of these April 1948 staff discussions was it made clear to the British that the Americans were planning to use atomic bombs regardless of such soul-searching. The JPS were suddenly therefore confident of an “immediate use of strategic air forces using atomic bombs,” although they had been “quite unable to get from the Americans any estimate of the targets to be attacked or the probable efficacy of this offensive and . . . we do not believe they have any idea how many atomic bombs will in fact be available.”¹² As a result of these talks, a joint

¹¹ PRO, JP(48)11(Final) of 9 Apr 1948 in DEFE 6/5.
¹² PRO, JP(48)47(Final) of 18 Apr 1948 in DEFE 6/5. Condit’s account of US planning suggests that there was more certainty to US plans too after these discussions (The History of the Joint Chiefs of Staff: The Joint Chiefs of Staff and National Policy Vol.2 1947-9, pp.286-90). Perhaps the US and UK had egged each other on.
‘emergency’ war plan for hostilities before the middle of 1949 was adopted, codenamed Doublequick. The plan included the assumption that “the United States Government and His Majesty’s Governments in the United Kingdom and Canada will authorise the use of atomic bombs at the outbreak of war.” It was also now clear that chemical and biological weapons would not be available “on such a scale as to be considered weapons of mass destruction.” What was still not clear at this early stage was whether the atomic offensive could be decisive, and when British, American and Canadian planners met again in Washington in October they specifically revised their plan, now renamed Speedway, to inject more realism for the eventuality that at D+3 months the UK might be under genuine threat of invasion. This time, in addition, the US appears to have presented a proper plan for the atomic air offensive, and the JPS was able to report discussions of targeting priorities: the British delegates had suggested that breaking the Communist control of the Russian people should be the chief aim, whilst the Americans had stressed Soviet war-making capacity. In practice, as the JPS was able to conclude, the two meant the same thing: the “main towns.” In this way, it gradually became clear that a war against the USSR in the late 1940s would have to begin with an atomic offensive; the implications for the UK were becoming more serious and in 1948-49 the first opposition to such a strategy was becoming clear. Patrick Blackett published a book outlining anti-atomic views he had been expressing in private since 1945. Sir Henry Tizard, Chief Scientific Adviser to the Minister of Defence, and Viscount Montgomery, Chief of the Imperial General Staff, were both by now concerned to point out that the prevention of war, through deterrence, was far more important than preparations for atomic hostilities. They also attempted to secure a higher priority for conventional weapons. The JPS too was concerned by 1949 that whilst an atomic offensive made sense in the case of war in the short term, by 1957 the Russians would have enough of an atomic stockpile to make the logic once again questionable. These early discussions are interesting in the light of the ‘nuclear sufficiency’ debates of the late 1950s covered in chapter four.

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13 PRO, COS(48)110(O) of 18 May 1948 in DEFE 5/11. For information on chemical and biological warfare research see Carter and Pearson, ‘Past British Chemical Warfare Capabilities’ in RUSI Journal Feb 1996, pp.59-68, and Palmer, ‘The Drift of Biological Weapons Policy in the UK 1945-65’ in Journal of Strategic Studies Dec 1997, pp.115-45: at no stage were plans for the employment of such weapons as realistic as those for the atomic bomb; they soon ceased to be discussed in the same breath.

14 PRO, JP(48)130(Final) of 4 Nov 1948 in DEFE 6/7.

15 PRO, JP(48)136(Final) of 6 Nov 1948 in DEFE 6/7.


18 See PRO, JP(49)124(Final) of 16 Dec 1949 in DEFE 6/10, and papers for Sept-Oct 1949 long term staff talks with the US in DEFE 6/11. In 1950 the JPS rehearsed the arguments once again, but this time found an “unanswerable military case” for the use of the bomb: JP(49)172(Final) of 3 Mar 1950 in DEFE 6/11.
The Royal Navy and Nuclear Weapons

The questions of the continental commitment and the search for allies had haunted British policy-makers throughout the interwar period, and, as the war drew to a close, some very pessimistic assessments were again produced. Papers from early in 1947 stop short of assuming that the United States or Western Europe would be allied with the UK at all. This was softened in March to not knowing when the US might join in on our side, but only with the April 1948 staff talks and the adoption of Plan Doublequick was the assumption changed to the more comfortable "America will be allied with us." France, the Benelux countries, Norway, Portugal and Turkey were also now numbered with the allies although Italy and Greece, rather ambiguously, "could not be relied upon as an asset in any computation of forces." Progress was now being made each spring with the construction of a system of alliances: the Anglo-French Treaty of Dunkirk in March 1947, the Treaty of Brussels in March 1948 and finally in April 1949 the North Atlantic Treaty. This fortunate new position facilitated suggestions of burden-sharing, and so for Plan Doublequick it was agreed that in the event of war the Royal Navy would share North Atlantic and Mediterranean convoy escort duties equally with the US Navy. In 1948, the US also moved to base some of its strategic bombers in East Anglia and the RAF was able to acquire some B-29s of its own. Along with the benefits, however, came extra responsibilities, and so the decision was made to contribute land forces to the defence of Western Europe. This was partly for political reasons and partly for sound reasons of strategy: nobody wished to see V-1 and V-2 bases established on the Channel coast again, or Russian submarines operating from Brest or St Nazaire. At the same time, although Plan Doublequick envisaged at least an attempt to stand on the Rhine, it was recognised that there was little that could practically be done on the ground, and so the air offensive strategy came to be seen in a sense as an alternative to a meaningful continental commitment: "the least we can do."

It is worth making a final comment to conclude this brief canter through the most politically important defence planning issues. In January 1947 the Chiefs formally discussed and approved the 'three pillars' of postwar British strategy at a conference with Prime Minister Attlee. These were the defence of the UK, of the Middle East, and of sea communications. All agreed that the Navy's key role was in the last of these: "The Royal Navy, with its air arm, must be enabled to perform its vital role in the control of sea communications." This overriding assumption is apparent too in contemporary naval writings: "It is the main function of the Navy to

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20 PRO, COS(47)79(Revise) of 21 Apr 1947 in DEFE 5/4; JP(48)11(Final) of 8 Mar 1948 (discussing a possible war in 1957) in DEFE 6/5.
21 PRO, COS(48)110(0) of 18 May 1948 in DEFE 5/11.
22 PRO, JP(48)16(Final) of 27 Jan 1948 in DEFE 6/5.
protect these sea routes in war”... “The historic duty of the Royal Navy has been the maintenance of our sea communications. Weapons have changed... but the Navy’s place in the grand strategy of war has remained unaltered through the centuries.”

This concern, forgotten at times in the past, had been underlined in the most forceful terms possible during the Second World War. Deterrence, the atomic bomb and the defence of Western Europe received more political attention – and continue to receive more attention from historians – precisely because they were more controversial questions at the margin of the debate.

Early guesswork

In June 1945, a view of the future nature of warfare was set down by Tizard in a report commissioned by the Joint Technical Warfare Committee. Tizard’s brief in November 1944 had been to look at developments in warfare between highly industrialised nations, including such technological wonders as supersonic jet fighters, developments in radar and electronic warfare, rockets and guided weapons, fast submarines and chemical and biological weapons. Tizard was famously denied access to atomic secrets in preparing his report, although as a leading member of the scientific community he was aware of the physics involved and in fact the report contained several references to atomic weapons.

Nevertheless a revision was called for to look at atomic warfare, and when Tizard somewhat huffily refused to do this the JTWC arranged to reconvene without him on 16 October 1945 for a first discussion. Rear Admiral Robert Oliver, ACNS(Weapons), had the foresight to call on the heads of division in the Naval Staff as early as 15 August for their opinions, which were developed over the succeeding two months and discussed before the JTWC meeting. The papers give a fascinating snapshot of naval thinking in the weeks immediately after the bomb was used.

The need for more information was made clear by nearly all of the contributors. The Director of Navigation (D of N) was inclined to be especially cautious “until more is known of the results of experiments.” Captain Guy Grantham (D of P) listed in detail the sort of information needed for a sober assessment of the bomb’s potential to be made: destructive power, the possibility of limits or control on manufacture, the likelihood of effective countermeasures other than simple retaliation, the production effort required, and the likelihood of the explosive’s being widely available and capable of employment in a variety of


25 As Gowing points out in Independence and Deterrence, Vol.1 p.163, three members of the JTWC, Thompson, Blackett and Ellis, had been on the Maud Committee in 1940 and were thus aware of the atomic secret; Tizard’s paper was COS(45)402(0) of 16 Jun 1945 – see Lewis, Changing Direction, pp.181-7.

26 ‘The Atomic Bomb – its influence on naval warfare and naval policy,’ PRO, ADM 1/17259.
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The need for high-level guidance is also mentioned in the Naval Staff’s contributions: DGD remarked that “discussion of [the bomb’s] influence on Naval warfare on the high seas presupposes that atomic destructive power cannot in itself be decisive . . . on the home front,” and DTSD concluded that “in these circumstances it seems best that the thought should emanate from the highest source before coming to any detailed consideration of particular aspects.” DNOR developed these themes slightly further, warning that a war might be decided quickly, without the Navy’s having had time to mobilise, and that “the traditional function of the Navy of defending our lines of communication may be pointless if these lines are better attacked at their end points.” Flag Officer Submarines (FOSM) was equally uncertain whether sea communications could affect the outcome of a war in which “whole areas of industry and transport and millions of people were being obliterated daily.”

Certainly there is a perception in these early papers of Britain’s vulnerability: not a new or startling revelation, but one which had troubled strategists throughout the interwar period. There is also however a genuine belief in the possibility of countermeasures. The first of these was dispersal: DTSD, summing up the others’ contributions, advised dispersal throughout the Empire “if we are to be able to wage war with such nations” as the USA or USSR. D of P warned that unprecedented state power would be necessary in directing industry and settlement, along with “an Imperial Defence Policy far more cooperative, more unanimous and more virile than that which obtains at the present time.” Others were less hopeful. To the Director of Air Warfare and Training (DAWT), the fact that the Empire started with an advantage in dispersal, covering as it still did a quarter of the globe, was “poor consolation for the Mother Country.” DNOR summed up the whole discussion sensibly: “hardly practicable.”

Deterrence, in a fairly crude form, is also clearly understood in these documents. The threat of reprisal was mentioned by the Director of Anti-Submarine Warfare (DASW), ACNS(W), D of P and DNOR as the major disincentive to the use of atomic bombs. DNOR developed this thinking in quite advanced forms, referring to possibilities which would later be known to nuclear strategists as disarming first strikes, counterforce target limitation, self-deterrence in the face of overwhelming conventional strength and mutual intra-war deterrence. Several contributors mentioned the precedent of gas, which had never been used in the Second World War, although DNOR thought the analogy could be taken too far since gas was “messy and annoying, rather than militarily decisive.” D of P was optimistic about the possibility of countermeasures: “so far in history, the appearance of a new weapon has always been followed by suitable countermeasures,” although DNOR again was less hopeful, discounting the likelihood that “some gadget like degaussing” might be discovered as it had been when the magnetic mine first became a threat. Even D of P had to conclude apocalyptically: “It becomes increasingly obvious that the greatest hope for our

Wallace Akers and later Sir John Chadwick were now providing some information from America, but their correspondence was available only to the Chiefs and the JTWC, and probably not to the Naval Staff – see PRO, Akers memo 31 Aug 1945 and Chadwick memo 10 Oct 1945 in CAB 82/26.
children and grandchildren lies in the enlightenment of man’s nature and an appreciation of the issues involved rather than in developing the material means of mutual destruction.” For DNOR, “the net effect of the Atomic Bomb is that the price worth paying for peace is now very much higher . . . the major function of our armed forces should now be the prevention of a major war, rather than the ability to fight it.” These are resonant remarks in the light of interwar thinking on vulnerability and appeasement, as well as later nuclear strategy.

Alongside these general conclusions, which were apparently accepted by all of the contributors, were a few hints of opportunities to come for the Navy. FOSM mentioned atomic propulsion for submarines; DAWT wondered whether “the delivery of atomic weapons against an enemy beyond the range of rocket attack from our own territory [might] devolve on the Navy.” DNOR raised the possibility of submarines firing missiles with atomic warheads and DASW thought wars of a limited nature would still be likely to break out between or involving small nations not armed with atomic bombs. On the basis of all these ideas and discussions, DNOR evidently counselled caution when the JTWC met on 16 October, recommending that Tizard’s conclusions on conventional warfare should not lightly be set aside.28

Finding out more

It is easy to forget that at the beginning of the nuclear age not much was actually known about atomic weapons. The dropping of the first bombs was unexpected, although the possibility of atomic weapons had been a commonplace of science fiction for some time and the secret was already more widely known than had been intended. At Potsdam, Stalin was able to nod inscrutably, perhaps with a wry inward smile, or perhaps with a frown, when Truman told him of the Alamogordo test.29 To understand the effect of atomic weapons on thinking in the Royal Navy, I believe it will be useful to spend some time establishing just what baseline of knowledge was available at this stage.

We have already seen that Tizard was not privy to atomic secrets; it is less well known that until January 1945 even the Chiefs had “no idea how far our own research and development has proceeded.”30 The fact of the bomb’s existence became rather obvious on 6 August, but the answers to some quite basic questions were unavailable even within the defence community. This information became available only gradually – and initially, at the Admiralty and elsewhere, only to a small circle. The first major source of information was the so-called Smyth report, published in America in August 1945 and including a basic account of nuclear physics and the atomic bomb project.31 This was soon followed by the reports of

28 Lewis, Changing Direction, p.194.
29 Holloway, Stalin and the Bomb, p.117.
30 PRO, Ismay to Anderson, 6 Jan 1945 in PREM 3/139/11A; see also Gowing, Independence and Deterrence, Vol.1 p.170 and Vol.2 p.5.
British observers sent to Hiroshima and Nagasaki. 32 Sixteen British officials, headed by Professor Thomas of the Home Office and including one Admiralty representative, DNOR’s LtCdr A D Evans, made up a party permitted by the Americans to collect data in the months after the attack. Three copies of their report were evidently received in the Admiralty and circulated initially to seventeen addressees. 33 True to its Home Office civil defence leadership, the team concentrated mostly on the effects of the bombs on various kinds of buildings, concluding that an attack on a typical British city would leave 400,000 people homeless — sadly, not all of these people would “constitute a re-housing problem.” The new and unique effects of atomic weapons across the electromagnetic spectrum were listed, from unusually severe flash burns to penetrating radiation causing miscarriages and “very low sperm counts.” Of more interest to a military reader was the annexe concerning the effects on shipping, military and air installations. Both explosions had been over land, but the effects on light shipping in rivers and harbours had been studied. At Nagasaki, the bomb had exploded 2800 yards from the harbour and only one medium sized vessel, an 875-ton coaster, had been damaged. Small wooden craft had been damaged on the river at between 300 and 2500 yards range, and twenty had been sunk. At Hiroshima, the harbour was still further from the explosion and what damage there had been was put down to a (later) typhoon. The report’s conclusions were that even small merchant vessels were at little risk from an atomic explosion at 3000-yard ranges, although the risk of injury to crew, especially by flash, was appreciable. Quay walls, of solid construction, would be unaffected even directly below the explosion and, since both bombs were air bursts, no fall-out had been observed. Harbours could probably continue to operate in such conditions.

The next major source of information for the British came in July 1946 with the US Bikini Atoll tests, Operation Crossroads. The McMahon Act, restricting information exchanges with foreigners, was already passing through Congress but observers from many countries, including the USSR, were nevertheless invited. It is clear that of all the foreign observers the British had by far the most privileged access; in particular, given the US Navy’s control of the operation and its intention specifically to study the effects of the bomb on ships and submarines, it is clear that the Admiralty and its scientists were very closely involved. 34 Of the eight men in the British military delegation, six were from the Admiralty: Captain Stephen Roskill, 

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32 COS(46)22(O) of 23 Jan 1946, preserved e.g., in PRO, ADM 205/66, is the official report. Some officers of the British Pacific Fleet, including future First Sea Lord Edward Ashmore, were also able to visit the ruined cities of Hiroshima and Nagasaki for sightseeing purposes; no effort seems to have been made to collect their observations and opinions systematically — see Ashmore, The Battle and the Breeze, p.71. The US Strategic Bombing Survey also published a report on the damage to Hiroshima and Nagasaki in June 1946 (The Effects of Atomic Bombs on Hiroshima and Nagasaki, USSBS, Garland edn. 1976 Vol.7).

33 PRO, registry markings and note from ISL’s secretary in ADM 205/66.

34 See papers in PRO, AB 16/346 and CAB 122/375, respectively Lord Portal’s and the Washington Joint Staff Mission’s files on the tests. One of the closest involvements was that of Ernest Titterton, a British scientist who gave the loudspeaker countdown for the underwater test; amusingly, one Los Angeles reporter took his accent for that of a Harvard American (see Szasz, British Scientists and the Manhattan Project, p.48).
Chapter 1: First Thoughts

later the official historian of the war at sea, who had been working at the mission in Washington; Cdr Arthur Hezlet from DTASW; Dr Offord (A/DNC); Dr Hill from the underwater explosions establishment UNDEX; Cdr(E) Goodwin, an expert in shock damage to ships; and Cdr Hancock of the RCNC. Two more Admiralty scientists, Dr Powell of UNDEX and LtCdr Daniel of DNC, formed part of a separate eight-man team under William Penney, himself a former Admiralty scientist, which was fully integrated into the US Manhattan Project group. Even one of the two MPs who went as the publicly declared British representatives was a retired naval officer. Six other British civilians, one Combined Operations officer and two airmen, plus the press corps, also travelled to Bikini in various capacities. A wealth of information became available. Penney in particular was highly prized by the Americans and indeed General Groves, the head of the Manhattan Project, appears specifically to have requested his help on weapons effects at least twice.35 Although the British had not been involved early enough to influence the general planning of the Able and Baker (air burst and shallow underwater) tests, it is also clear that strenuous Admiralty efforts were being made to gain a voice in planning for the third test, Charlie (deep underwater), which was ultimately cancelled.36 In the end, Admiral Moore at the Admiralty mission in Washington felt influential enough to record his disappointment at this cancellation to the Chief of Naval Operations, Admiral Nimitz, along with his continued interest should the decision be reviewed.37

Of Roskill’s comprehensive report, issued in the Admiralty’s Confidential Book series, eleven of the original twenty-five copies went to various addressees in the Admiralty. The Air Ministry received four.38 The effects of the Able and Baker tests on vessels, and the likely effects on personnel and fighting efficiency, were detailed. These were then extrapolated to show the likely effects of each type of explosion on a naval dockyard (Portsmouth was the example used), a busy commercial port (Liverpool), a fleet at anchor (in Scapa Flow or the Clyde), an amphibious landing, a convoy in daytime anti-submarine formation and a fleet at sea in cruising disposition. Only a few rather more vague estimates of the effect of a deep underwater test were possible.

At the tests themselves, the shallow underwater explosion made the biggest impression.39 Underwater pressure and shock caused greater hull damage and more sinkings than in the air burst test; submerged submarines and the 26,000-ton


36 See PRO, COS(46)10th mtg 18 Jan 1946 and COS(46)113rd mtg 18 Jul 1946 (extracts), with later papers in CAB 122/375.

37 PRO, Moore to Nimitz, 19 Sep 1946 in CAB 122/375.

38 The report, CB004467A later BR1297A, is preserved in PRO, ADM 234/584, 585 and 586; extracts can also be found in ADM 239/378 and in the Roskill Papers at Churchill College, ROSK 2/20; related papers are in CAB 122/375, including notes for a lecture Roskill gave to an audience in the Admiralty on 28 October 1946.

battleship *Arkansas* were among the vessels lost. A column of about two million tons of water rose 5000 feet from the lagoon and over a period of several minutes a wide area was covered with spray – the 'base surge' phenomenon. This and the fifty-foot waves experienced near the explosion caused radiological safety problems and ultimately the abandonment of decontamination experiments. The air burst, by contrast, caused no contamination and fewer sinkings, although blast and heat effects were more serious and the superstructures of many vessels were badly damaged. It was clear too from measurements of gamma radiation and neutrons that any ship within a mile of such a blast would gradually have become inoperable due to radiation casualties. In sum, it could be seen that all ships would be irreparably damaged within half a mile of either type of explosion, and that casualties would be extremely serious even at two or three times this distance. However, one corollary was that “the range of destruction of the bomb can be substantially decreased by protection of personnel alone.”

It was the extrapolation of these findings to real-life situations, as opposed to an artificial array of target ships, which was of most interest to those trying to assess the bomb's impact on naval warfare. Compact targets were clearly at greater risk from atomic attack, and the Portsmouth dockyard, in particular, would have suffered grievously. Either type of explosion would have sunk, damaged or inflicted heavy casualties on all ships at the base, despite the fact that here, and at the other harbour considered, Liverpool, topography and shallow water would have lessened underwater shock and radioactive contamination. A fleet at anchor would also have suffered badly: less than fifteen percent of units – and these the minor vessels – escaping damage or casualties, although at Scapa Flow two bombs would have been required to cover the whole anchorage.

More hopeful conclusions were possible, however, for the other scenarios studied. In a typical small convoy of twenty-eight merchant ships and six escorts less than half of the merchantmen would have suffered damage or heavy casualties, and none of the escorts would have been affected at all. A fleet at sea, meanwhile, would generally be in sufficiently distant company for only a single vessel to be sunk or irreparably damaged by any one atomic bomb. Both convoy and fleet were spared the worst of the contamination from an underwater burst by their ability to turn away from the explosion. Perhaps surprisingly, even a large amphibious operation would advance towards its objective on such a wide front that only a quarter of the landing craft, and none of the supporting vessels, would be vulnerable to an air burst, and only slightly more to an underwater explosion. Because of the difficulties of detection and attack, submerged submarines would have “the best chance of survival of any ship” in all cases. But any target at sea was thought to constitute an uneconomic use of an atomic bomb: “For example, the same effect [in damage against ships] as that caused by the shallow underwater burst in Trial B could have been achieved by some thirty torpedo hits (ten tons of TNT).”

Roskill summarised the conclusions of the Crossroads tests as follows:


41 From Roskill's conclusions in the report, PRO, ADM 234/584.

(a) The enormous energy of the atomic bomb is expended very uneconomically against ships.
(b) In spite of their scarcity and the fact that to use them against ships is uneconomical, atomic bombs probably would be used against a maritime nation to disrupt its seaborne trade. Should the atomic bomb be so used it is a sufficiently powerful weapon to dominate the war at sea.
(c) Dockyards and ports are extremely vulnerable to the atomic bomb air burst and the concentration of ships in them is in greater danger than at any other time.
(d) Other than in dockyards or in ports, it seems practicable so to disperse ships at sea or in harbour that the atomic bomb will only seriously affect one ship.
(e) Ships are liable to attack by the air, shallow or deep underwater bursts.
(f) The range of destruction of the air and shallow underwater bursts can be substantially decreased by measures to protect personnel alone.
(g) The resistance of present types of ship can be considerably improved.
(h) Redesign of ships to improve their protection from atomic bombs can be profitable only if no sacrifice of fighting characteristics is thereby entailed. No increase in size or strength can prevent their destruction if the bomb is close enough.
(i) The best naval construction policy for the future must aim at the spreading of risks among a larger number of the smallest and most easily replaced ships capable of exercising the functions of seapower.43

It is hard to quarrel with these findings, certainly on the basis of the knowledge available to Roskill, except perhaps to suggest that flash blindness might have been a more serious source of casualties than he expected, especially in an amphibious operation during which more personnel would have been exposed above decks in landing craft. The overall impression is of a weapon which, whilst awe-inspiring in its concentrated power and potentially important in fighting a war, did not of itself pose a mortal threat to most naval operations at sea, especially given the right tactical response. This tactical conclusion was highlighted by another eyewitness:

Admiral Mahan wrote that: 'The student will observe that changes in tactics have not only taken place after changes in weapons ... but that the interval between such changes has been unduly long ... [this] is a very great evil. It can be remedied only by a candid recognition of each change.' ... How far Mahan's pessimism with regard to 'candid recognition' and rapid acceptance of the consequential changes in tactics will, on this occasion, be substantiated only time will show.44

After the Bikini tests, the Royal Navy's knowledge of atomic weapons appears to have stood still for some time. In 1949, much the same list of weapons effects was

43 *ibid.* Roskill's words in (b) were carefully chosen: to "dominate" the war at sea would not necessarily be to win it. His findings should be compared with the more apocalyptic US official report: "if used in numbers, atomic bombs can not only nullify any nation's military efforts, but can demolish its social and economic structure and prevent their re-establishment ... it is quite possible to depopulate vast areas of the earth's surface, leaving only vestigial remains of man's material works." The US report was published in 1947; this passage is quoted in Weisgall, *Operation Crossroads*, pp.291-2.

being repeated.\textsuperscript{45} Doubtless this is the result of the lapse in atomic exchanges with
the Americans during these years. There is no hint for example that any information
on the Sandstone tests of 1948, which demonstrated the feasibility of smaller bombs
and more efficient use of fissile material, were available to the Navy when searching
for the right performance and weight assumptions for carrier-based atomic bombers
in 1948-49. By September 1948, the Naval Construction Research Establishment
was reduced to investigating further the phenomena experienced in underwater
atomic explosions with the aid of 1/50 scale TNT charges, tin baths and oil drums.
This demonstrated the possible extension of lethal ranges for shock and pressure
using deeper explosions in a greater depth of water. Some phenomena, especially
the mushroom cloud and contamination seen at Bikini, could not be replicated in
this way, however, since gravity was more difficult to reduce to 1/50 scale.\textsuperscript{46}
American publications on weapons effects also continued until the 1950s to refer
back to the 20kt bombs used against Hiroshima and Nagasaki.\textsuperscript{47} Further extension
of knowledge, especially on the effects of atomic bombs in harbour areas, would
have to await the UK's own test in the Montebello Islands in 1952.

Implications for the defensive

As we have seen, the information gleaned from the Bikini tests was capable of
hopeful interpretation when applied to naval targets at sea. In this section I shall
consider the lessons learned from this, from estimates of the likely availability of
atomic bombs, and from the first Royal Navy exercise to feature defence against a
notional atomic attack.

The revised April 1946 version of Tizard's report concluded that centres of
population, distribution and communications were likely to be the most profitable
targets for atomic attack, at the same time not ruling out main fleets and bases,
convoy's and military concentrations.\textsuperscript{48} There had been some discussion of the
amount of atomic bombing necessary to win a war and of the high degree of British
vulnerability in this respect, but it was still unclear whether it would be possible to
win a war by atomic bombing alone. It seemed to follow that the Navy's role of
defending the Empire's sea communications would again be important in a long
war, and therefore that anti-submarine and anti-aircraft defence were still important
too. The JTWC recognised that atomic bombs would be more economically used
on land than at sea; again the implication was that the Navy could plan to fight a
third, non-atomic, Battle of the Atlantic. An Air Ministry brief on the report
derided this belief, seeing the paragraphs on the Navy and Army as "almost . . . an

\textsuperscript{45} PRO, ADM 239/489, Exercise Trident papers, pp.132-4.

\textsuperscript{46} PRO, ADM 280/10; Report NCRE/R43, Powell and Hart, September 1948; the results of
this work were displayed at Exercise Trident in 1949 - see Friedman, \textit{The Postwar Naval
Revolution}, p.230. On weapons effects work in the 1940s, see also Gowing,
\textit{Independence and Deterrence}, Vol.2 p.455.

\textsuperscript{47} US Department of Defense, \textit{The Effects of Atomic Weapons} (see the note in the
bibliography on published information about weapons effects).

apologia for their existence” in the atomic age.\(^\text{49}\) We should remember however that not until 1949 was it agreed by the Chiefs that the bomber offensive at the start of a war would have to involve atomic weapons. Certainly in 1946 even Tedder “felt that it was not certain whether [atomic weapons] would in fact be employed in any future war.”\(^\text{50}\) McGrigor (VCNS) was able to stress that “irrespective of atomic bombs and biological warfare, if no antidote to the latest types of fast submarines was found before any future war, our ability to continue the struggle would be seriously impaired in a very short time.”\(^\text{50}\) As such the Navy, identified as a lower-priority target, and later reassured by the Bikini data that at least some naval operations would be possible even under atomic attack, could feel justified in devoting time and effort to planning for conventional war.

Nor did this apply only to the short term: in a paper of November 1946 the JPS, no doubt on JIC advice, estimated that the USSR would possess between five and twenty-five atomic bombs by 1951 and forty to sixty by 1956.\(^\text{51}\) There is no reason to suppose these assessments changed significantly until after the first Russian atomic test, and although forty to sixty represented an impressive and threatening arsenal there can have been no reason to suspect, either, that many of these weapons would be available for use against purely naval targets.

The Royal Navy therefore continued to envisage a conventional war at sea. A number of Admiralty studies concluded that modifications to ship design to meet the atomic threat should not be introduced unless their cost, in money and fighting efficiency, was minimal.\(^\text{52}\) In Plan Doublequick, the threat to sea communications was expressed in conventional terms: tactical aviation, if and when freed from the requirement to support the land battle in Western Europe; submarines, not initially as effective as those of the Germans in 1939; and the mining of UK waters, the Sicilian Narrows and the Suez Canal. In response, Western naval forces would attack bases on the Kola Peninsula and enter the Black Sea as well as operating anti-submarine hunter-killer groups and providing conventional convoy escorts.\(^\text{53}\) A further interesting summary of Anglo-American thinking on the war at sea can be found in a detailed JPS study commissioned in 1948 and eventually completed in March 1949.\(^\text{54}\) This looked at a war in 1957 and considered in turn four methods of protecting sea communications. It is interesting to note the prominence given, doubtless under American influence, to ‘offensive’ methods over convoy.

\(^{49}\) PRO, brief for CAS of 17 May 1946 in AIR 20/4658.

\(^{50}\) PRO, COS(46)99th mtg, quoted in Lewis, Changing Direction, p.241.

\(^{51}\) JP(46)201(Final) of 28 Nov 1946, quoted in Lewis, Changing Direction; in summer 1948 the JIC’s estimate was 6-22 Russian atomic bombs by 1953 (see Hennessy, Never Again, p.248); the Americans were still estimating 20-50 by 1955, and only after the Soviet test in 1949 was this estimate increased to 100-200 by 1954 – see Condit, History of the Joint Chiefs of Staff: The JCS and National Policy Vol.2 1947-9, pp.525-6.

\(^{52}\) See PRO, PD/OL/055/48 of 22 Apr 1948 in ADM 1/26710; also papers in ADM 1/25258.

\(^{53}\) PRO, COS(48)110(O) of 18 May 1948 in DEFE 5/11.

\(^{54}\) PRO, JP(48)65(Final) of 31 Mar 1949 in DEFE 6/6.
The same study also recommended that "the problem of operating ports under heavy air attack and of alternative methods of discharge and of distribution of cargoes should be examined as a matter of urgency." As we have seen, DNOR had expressed his concern as early as September 1945 about the utility of defending communications at sea when they had become so vulnerable at their end points. Roskill revisited the subject after Bikini in the pages of the Naval Review, seeing dispersal and mobility as the key lessons. The JPS, discussing the effect of atomic weapons on the organisation and function of the armed forces in 1949, concluded again that "the most serious threat to Allied sea communications is against ports.

The question was bound up with civil defence. Various remedies were possible. Time spent in harbour would have to be reduced; warships replenished at sea where possible; port defences against aircraft, 'sneak craft' and submarines improved; and foreign merchant shipping inspected in case of clandestine attack. Ships would have to be dispersed among and within ports and the Navy would have to help operate small alternative ports, provide landing craft for cargo discharge over the beaches and so forth. The Navy would also have to organise itself differently, basing as many ships, logistic and repair facilities and even training establishments as possible overseas, and standing ready to mobilise before a threat could develop fully. Chapter two will examine some of the serious work on these subjects undertaken within the Admiralty and elsewhere during the early 1950s.

Meanwhile, an opportunity to test some of the other ideas outlined above arose during Exercise Sunrise in the Western Approaches at the end of 1948. The scenario envisaged Red (the Home Fleet) sailing from the Azores to simulate shore bombardment, destroyer raiding and a carrier air strike against Blue, at Plymouth. It is clear that the Home Fleet had in mind a strike against Soviet bases. One of the hazards faced during the exercise was a simulated atomic bomb attack by the RAF. Ultimately the value of the exercise was badly reduced by the winter weather. Bomber Command strikes had to be cancelled on 8 December and again overnight on 10/11 December, whilst on 9 December the Fleet avoided attacks mounted at 1500 and 2100 hours thanks to radio deception and weather conditions. In the end a lone Coastal Command Lancaster managed to drop a simulated atomic bomb at 0302 hours on 11 December, too far from the fleet to cause damage. The satisfaction this caused — "the exercise must have administered a sharp lesson to RAF technicians on the realities of warfare over the oceans" — was tempered by the Home Fleet's own inability to launch carrier fighters or, later, to carry out the planned carrier strike. One effect of the exercise was to provoke a long debate about the ideal cruising disposition to be adopted by a fleet under threat of atomic attack. C-in-C Home had altered his formation in consultation with US and scientific advisers present on his flagship, but the fairly wide dispersal he adopted meant greater vulnerability to conventional air and submarine attack. The commander of the Second Cruiser Squadron later remarked that "it is to be hoped

56 PRO, JP(49)45(Final Revise) of 23 Sep 1949 in DEFE 6/8.
57 See the extensive collection of papers and charts in PRO, ADM 116/5779 and 5780.
58 PRO, Capt Ionides of HMS Diadem, signal 1966/65 of 21 Dec 1948 in ADM 116/5779.
that undue attention will not be given to the Atomic Bomb threat, in preference to measures against better proved methods of attacking ships."  

The net effect of these debates can only have been to reinforce the Bikini findings on the relatively low vulnerability of ships at sea to atomic attack in the late 1940s.

Implications for the offensive

The US Navy was almost as quick to embrace an atomic bombing role as the US Army Air Force. Navy Secretary Forrestal was closely associated with this enthusiasm — as early as September 1945 he was celebrating to Congress the achievements in the late war of the US Navy’s carrier task groups: “one of the most powerful forces in existence in the world today . . . which we believe will be capable of delivering atomic bomb attacks.” By October the US Navy had a Deputy Chief of Naval Operations for Special Weapons, Rear Admiral Blandy, working on the plans for the Bikini tests, and by the end of the year its Bureau of Aeronautics was looking at plans for a new supercarrier able to launch strategic bombers. During 1948 these plans were boosted by the successful launch of a Lockheed P2V Neptune, large enough to carry one of the existing atomic bombs, from the USS Coral Sea, and by the Sandstone test series in the Pacific, which held out the possibility of smaller and more suitable weapons becoming available. The plans for the new supercarrier, now known as the United States, were well advanced and the keel was laid in April 1949; the North American AJ Savage, a purpose-built carrier atomic bomber, was also reaching production. In fact, the US Navy’s plans were forestalled when the United States was cancelled, just days after she was laid down, and when the first AJs went to sea the Air Force refused to assign them targets.

But if the US Navy’s plans were thwarted for a time and politically motivated — “aviation forces with a nuclear capability were the only kind of military force that the postwar Congress was inclined to support with enthusiasm” — this does not detract from its enthusiasm. A far cry from the Royal Navy’s timid reaction, stressing the limited impact of the bomb on the war at sea?

In fact, as we have seen, the Naval Staff’s responses to ACNS(W)’s questions in the autumn of 1945 had already thrown up a few suggestions of the possible offensive naval uses of atomic weapons. This thought re-emerged at the start of 1948 as the service Directors of Plans began to think seriously about atomic offensive plans for a war against Russia. On 9 January, the JPS was instructed to investigate a possible requirement to operate strategic bombers, weighing up to 100,000lbs, from two or three Navy carriers as part of this offensive. Assuming that the aircraft involved were to comply with the B35/46 specification — that of the later Victor and Vulcan — and plotting the USSR’s main industrial areas, and the

59 PRO, Note of 13 Jan 1949 in ADM 116/5779. The correspondence continues into 1950 on Admiralty docket M.0296/50, also bound with ADM 116/5779.
60 Davis, Postwar Defense Policy and the US Navy, pp.194-5.
61 ibid., p.256.
62 ibid., p.196.
63 PRO, JP(48)7(O)(T of R) of 9 Jan 1948 in DEFE 6/5.
coverage thereof that could be expected from bases in the UK, Egypt, Pakistan, Alaska, Japan, Cyprus and Iraq as well as from carriers in the Barents, Okhotsk and Arabian Seas, the JPS showed that carrier-based bombers would indeed be advantageous in a potentially lengthy strategic air offensive against Soviet war-making capacity. This would have been especially true if, as the report suggested, there were political or military difficulties with the use of bases in Cyprus, Iraq and Pakistan. Atomic air strikes from carriers would however have meant a major sea and air operation even if, as in the case of the important Volga-Ural industrial area, they did not require a particularly close approach to Russian waters. The weight of attack would have been small: four aircraft each with a single bomb from each of two or three carriers. It was noted that small variations in assumptions would also dramatically affect the report’s conclusions. An increase in B35/46 combat radius from 1500 to 1800 miles, for example, would wipe out much of the carriers’ advantage over land bases.

When the Chiefs discussed the report in March, Rear Admiral Oliver was less than wholehearted in his recommendation of the carrier option, choosing to stress for example the deterrent and diplomatic effect of moving the ships into position off the Russian coast, rather than their absolute value should the offensive be carried out. The Admiralty, he explained, “considered the main purpose of carriers was to establish control of the sea. They were, however, willing to consider the use of aircraft carriers as mobile airfields if it was worth while.”64 The Chiefs directed an investigation into the possibility of reducing the size and weight requirements for the carrier aircraft or improving the range of the land-based version. In May, the Admiralty came back again with a request to reduce the scope of their work still further. They wished now to investigate the smallest useful range requirement and the largest aircraft capable of operating from existing carriers, suitably modified, to see if these could be made to match.65 The answer was that a 2000-mile range would be necessary if the aircraft were to return to the carrier after a mission, for example against the Upper Volga from the Barents, but that an aircraft of a simplified design, minus the heavy and expensive landing gear, would be acceptable for a 3000-mile one-way flight. The RAF, predictably, began to make a fuss about the R&D effort that would be necessary to investigate these requirements, although Edelsten (VCNS) was keen to proceed so that the data could be factored into carrier conversion plans then under consideration.66 R&D effort was duly found. Work on plans to modify the wartime Illustrious-class carriers had begun in 1948, and suggestions were made to rebuild HMS Victorious and Formidable with an aircraft lift right aft to allow the longest possible uninterrupted flight deck for launch of a heavy aircraft, possibly with rocket assistance. A ‘Design Study B’ also existed to rebuild HMS Illustrious herself with a completely flush deck for the same reason.67 In April 1949 Caspar John, then working with the Ministry of Supply, mentioned studies of a 50,000lb medium

64 PRO, COS(48)41st mtg of 18 Mar 1948; extract in AIR 8/1792.
65 PRO, COS(48)102(O) of 5 May 1948 in DEFE 5/11.
66 PRO, COS(48)80th mtg of 11 Jun 1948; extract in AIR 8/1792.
67 Friedman, British Carrier Aviation, pp.305-6 and note 23.
bomber, seven of which could be carried on existing ships or twelve on a converted Eagle, and a 100,000lb bomber of which seven could be carried but not struck down in a hangar.  

The Navy was forced eventually to conclude that the requirement for special aircraft or carriers was unrealistic, although in recommending to the Chiefs that the investigations be dropped Bruce Fraser did mention wistfully that "current investigations show that there should be no difficulty in operating the American XAJ-1, which can carry an 'A' bomb, from the Ark Royal." It was clear all along, however, or should have been clear, that the idea of a carrier atomic bomber had little practical value. The sizes and weights of aircraft involved comfortably exceeded those being looked at seriously as part of the Navy's re-equipment programme - the largest, the N40/46, later the Sea Vixen, would weigh in at 23,000lb with a 2000lb store. The Admiralty, too, was clearly investing little political capital in the scheme, certainly compared to the US Navy. Oliver's remarks in March 1948 on the role of carriers, and the repeated attempts to reduce the requirement or somehow reconcile it with existing carriers plans, are telling. It is equally clear however that there were some naval officers interested in the idea. An Air Ministry brief ahead of one of the Chiefs' discussions on the subject was adamant: "Some sections of the Admiralty have been studying American Naval thought on the use of strategic bombers launched from aircraft carriers." There were references to the idea in relevant papers elsewhere in the defence planning world and in the naval press. The Navy would return later to the idea of carrier atomic air strikes.

Exercise Trident and conclusions

An important stage in the Navy's postwar assessment of its roles and priorities was reached in April 1949 with Trident, a major staff exercise and conference at Greenwich. This is not the place for a full account of the exercise, which seems to have been Bruce Fraser's brainchild and followed similar events staged by the other services. The proceedings do however constitute an interesting snapshot of

68 PRO, Exercise Trident Vol.2, pp.71-2, ADM 239/490.

69 PRO, COS(49)350 of 19 Oct 1949; endorsed by the Chiefs at COS(49)164th mtg. 4 Nov 1949, both in AIR 8/1792 (the XAJ-1 was the prototype of the North American AJ Savage).

70 PRO, Board memo B556 of 18 Jun 1948 in ADM 167/131. Friedman notes too that the aircraft catapults and arrester gear of the period could only cope with a 30,000lb aircraft (The Postwar Naval Revolution, p.90).

71 PRO, ACAS(P) to VCAS, 18 Mar 1948 in AIR 8/1792.


73 See the conference papers in PRO, ADM 239/489 and record in ADM 239/490; also Valor, 'Exercise Trident' in The Naval Review Feb 1949, pp.32-3 and Aug 1949, pp.207-16; Grove, Vanguard to Trident, p.56; Friedman, The Postwar Naval Revolution,
thinking and develop many of the ideas about atomic warfare already touched upon in this chapter. Whilst controversial, they also record the thinking of a good many very senior officers.

The aim, as stated in Fraser’s opening remarks, was to study the lessons of the Second World War and to apply them to a possible war in 1957, taking into account strategic, economic and tactical changes. The scenario emphasised offensive action in the context of a campaign to protect Britain’s sea communications. In particular, exercise play revolved around the establishment of a ‘zone of maritime control’ in the Arctic, necessary to bottle up Soviet submarines and to facilitate attack upon the ‘enemy submarine organisation’ of building ways; assembly, operational and repair bases; and road, rail, sea and canal communications between all of these. A great deal of work evidently went into the exercise: tanker pumping rates, ammunition use rates, engagement ranges and times, loading tables for commando forces and even the ease of building small wooden jetties in northern Norway were examined in minute detail.

It should be emphasised that Trident envisaged an entirely conventional war. Six months into a third world war, said the scenario, “neither side has yet used weapons of mass destruction. The enemy has not initiated their use because he considers that these are the only weapons which could defeat him, and the allies have not done so for political reasons.” Nevertheless two lectures on the effect of the atomic bomb on naval warfare were included in the exercise’s final session, the intention being to stimulate thought. A summary of knowledge on weapons effects was provided to participants, knowledge still being limited to the “nominal” 20kt bomb, roughly equivalent to those used at Hiroshima, Nagasaki and Bikini. Air bursts were assumed. William Penney explained that an underwater burst was harder to deliver reliably: “the physical conditions which have to be satisfied are not easily achieved operationally.” Participants were also introduced to some perceived limitations of atomic bombs: their dependence on large aircraft vulnerable to fighters and guided weapons, and the inaccuracy inherent in high-altitude bombing. It was recognised that “ports and dockyards will, however, be vulnerable and any concentration of ships in them might provide a worthwhile target. At sea or in harbour, it should be possible to disperse the ships so that a bomb will seriously affect only one ship. It must also be remembered that atomic bombs are expensive to produce and may never be sufficiently plentiful for general use.” As Penney put it in his own lecture:

\[\text{**pp.224-30.** The Trident scenario, with its emphasis on an offensive anti-submarine strategy rather than convoy, restarted an old debate and led eventually to the production of the pro-convoy Naval Staff History, *The Defeat of the Enemy Attack upon Shipping*: see Grove’s introduction to the Navy Records Society edn., esp. pp.xiii-xvii.}\]


\[\text{**75** PRO, Exercise Trident Vol.1, p.53, ADM 239/489.}\]

\[\text{**76** PRO, Exercise Trident Vol.2, p.236, ADM 239/490.}\]

\[\text{**77** PRO, Exercise Trident Vol.1, p.134, ADM 239/489.}\]
I think that atomic bombs will not commonly be used against ships at sea, at least until very large supplies are available. An opportunist attack with three or four bombs on one of our task forces operating near enemy territory might be tried once, but if our fighter interception and gunnery were good, the aim of the bombs at major ships is unlikely to be entirely successful. Should a successful guiding apparatus be fitted to the bomb, and should the interception be poor, the rate of loss of large ships per bomb might approach unity. Even so, it is unlikely that the loss of a capital ship would be a blow comparable, for example, with the loss of an ordnance factory specialising on guns, together with 10,000 industrial workers and their families. 78

John Hughes-Hallett, in the following lecture, was not so confident and turned to look at countermeasures, especially getting ships to sea with their fleet train in large task forces, and dispersing imports to small ports around the coast. The latter would involve careful planning and preparatory work, and the rejection of the idea of the United Kingdom as a main support area for allied forces. Design measures, including better anti-aircraft defence, would improve the prospects for ships at sea. He also mentioned the possibility of offensive atomic operations from Royal Navy ships, offering a vision of a fleet independent of support bases in the UK, and indeed drawing fire away from these bases, as it approached firing positions in the Black and Baltic Seas carrying V-2 rockets to attack the industrial areas of the USSR. Hughes-Hallett, no doubt anticipating criticism of his vision, concluded that "wishful thinking" is only a term invented by the unimaginative to discourage the enthusiastic. 79 Edelsten and Caspar John also mentioned the investigations underway into carrier-borne atomic bombers, but this idea has a low profile in the exercise record as a whole and Edelsten specifically listed carrier air strikes as a fourth priority for the Navy. The defence of sea communications naturally came first. 80

Tizard, speaking after dinner on the Navy's relationship with the scientists, cautioned that "we must get the general idea of the atomic bomb firmly in our heads . . . what we have got to think of is numbers . . . hundreds . . . and not play about at this stage by thinking about what one atomic bomb will do to the fleet." He still considered however that such numbers would not be available to the Russians, even in 1957, and concluded optimistically that he hoped the Russians were looking at the situation as scientifically as he was, and correctly drawing the conclusion that pitting themselves against the US and the British Commonwealth was "quite impossible." 81 Certainly there is no doom and gloom in the Trident papers about atomic warfare. By assuming right at the outset that war in 1957 would not be settled at once by an atomic exchange, then by rehearsing the arguments that the Navy would not be attacked and that countermeasures against atomic attack were

79 ibid., p.241.
81 PRO, Exercise Trident Vol.2, pp.252-3.
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possible – even in ports around the UK – the Navy was able to reaffirm its continued role, primarily in the protection of sea communications, in the atomic age:

We do not believe that the atomic bomb will be a serious threat at sea in 1957. By that date we estimate that the enemy will not have very many of these bombs, and, that being so, he is likely to find many more profitable targets than shipping at sea. Our defence against any such attack would lie in adopting greater dispersion of ships in company and in deploying our normal defences against the air threat. I need hardly remark too that greater dispersion will be necessary for ships in harbour. 82

The Trident exercise’s non-atomic assumptions were however quite at variance with those of the Chiefs, the government and defence planners generally who had concluded, as we have seen, that an atomic air offensive was important and inevitable at the outset of a war against the USSR. How did the Navy get away with this?

It is important to understand that this was not simply a head-in-the-sand refusal to accept a diminution of the Navy’s importance in the atomic age, whatever the rather patronising conclusions of one RAF observer at Trident. 83 We have seen that, until the end of the 1940s, there was wide uncertainty about atomic warfare. Some were keen on an air offensive; others regarded it almost as a last resort – a "strategy of despair" 84 – the least we could do to support Western Europe given that a conventional air offensive would not be decisive. The Navy fell into this second group and so, for example at Trident, strategic bombing continued to be questioned. 85 Tizard, Montgomery and others outside the defence community were already revealing misgivings or suggesting that the US should shoulder the strategic burden while the UK prepared for more thinkable conventional wars. Such ideas will be a continuing theme of this study.

Meanwhile we have seen that available knowledge in Britain tended to support a rather limited view of the atomic bomb’s utility at sea: a weapon which could perhaps destroy one or two ships in a formation, or a base or port around which, with careful planning, the war could continue. Estimates of Soviet atomic potential at this stage were low, and it did not seem that even by the late 1950s a nuclear holocaust was seriously in prospect. In any case, enormous destruction had been visited upon Europe and Japan by the bomber enthusiasts just a few years previously, and to what effect?

Bureaucratic inertia was also important. While atomic questions were still open, was it not sensible to digest the lessons of the Second World War and adopt only those conclusions which could be made certainly and comfortably? Thus in circulating a paper on the future strength of the fleet to the First Sea Lord in August 1945, his deputy pointed out that “although the development of the Atomic Bomb may radically alter the conception of war, the full implications of this new discovery 86

Ralph Edwards in PRO, Exercise Trident Vol.1, p.66, ADM 239/489.


Attlee in Jan 1947, quoted in Hennessy, Never Again, p.271.

PRO, Exercise Trident Vol.2, pp.16-17, ADM 239/490.
may not be known for some time; its impact on naval operations cannot at present be gauged. For this reason, it is considered sound to proceed with our present naval development, and the paper attached has been drafted with this in view."\textsuperscript{86}

DASW concluded that "for the next few years until we can see more clearly the shape of things to come it is essential to go on with our normal naval activities."\textsuperscript{87}

Looking back from the 1960s, Crowe noted that "essentially the Admiralty adopted a 'wait and see' attitude," at variance with that of the US Navy, and Gretton perceived a "vacuum of strategic thought."\textsuperscript{88} But one man's vacuum is another man's sensible pause for consideration, and as the White Papers of the period make clear, this was still considered an appropriate response at the political level too: "this is not the time to come to decisions about the eventual shape of our postwar forces"... "yet another transitional year"... "maintenance and repair... research and development."\textsuperscript{89}

The furore created by the bomb in 1945 soon died down, and indeed by 1949 atomic weapons were so seldom mentioned in the pages of the Naval Review that writers noticed and bemoaned the fact.\textsuperscript{90}

It should be stressed finally that the central organisation of defence in Britain remained weak in these years. The Chiefs' machinery and the infant Ministry of Defence in no sense worked elegantly to coordinate strategy between the independent service ministries. Montgomery, for example, despised the JPS and his colleagues the Chiefs, who were caught "in a sort of spell of hatred and spite which they could not break."\textsuperscript{91}

There was little chance in these conditions to police the strategic assumptions which underpinned the service estimates; politicians could only impose limits on the total sums involved. If war had come, we might have seen more of the arguments on strategy that had raged back and forth between Churchill, Roosevelt and their advisers between 1939 and 1945. In these conditions the Admiralty was free to consider, not the Navy's place in atomic warfare, but the atom's place in naval warfare. This being the case, it was free on the basis of its own knowledge and assumptions to reach its own comfortable conclusions.

\textsuperscript{86} PRO, DFSL's 10027/51 of 13 Aug 1945 in ADM 205/51.

\textsuperscript{87} PRO, undated note (must be Sep 1945) in ADM 1/17259.


\textsuperscript{89} Statements Relating to Defence: Cmd 6743, Feb 1946; Cmd 7042, Feb 1947; Cmd 7327, Feb 1948.

\textsuperscript{90} Sirius, review (Brodie, The Absolute Weapon) in The Naval Review Nov 1949, pp.400-4.

Fig. 5: Operation Crossroads

Captain Stephen Roskill RN, later the official historian of the war at sea, headed the team of British service observers at the first postwar atomic bomb trials, Operation Crossroads. The knowledge included in Roskill’s report became the basis for early naval views of the bomb (pp.45-8; Churchill College, Roskill papers).
Simulated atomic bomb with half mile radius (= ships sunk or badly damaged according to Roskill's Bikini trials report)

HMS Vengeance (light carrier)
HMS Theseus (light carrier)
HMS Aisne (destroyer)
HMS Ilustrious (fleet carrier)
HMS Duke of York (battleship)
HMS Diadem (cruiser)
HMS Cleopatra (cruiser)
HMS Sirus (cruiser)

**Fig.6: Exercise Sunrise**
The Home Fleet in 'cruising disposition no 22' during Exercise Sunrise, showing simulated atomic attack by RAF Coastal Command – too far away to cause damage. 0302 hours GMT, 11 December 1948 (pp.51-2; PRO, ADM 116/5779)
Chapter 2: Broken-backed Warfare

I have broken my nose on a stick,
I have broken my right hip,
I have something in my eye,
And yet I go on.

(traditional Somali poem)

In the early 1950s, with Cold War tensions at a new high after the outbreak of war in Korea, the UK embarked on a huge rearmament programme and dusted off plans for a third world war. According to the ‘three pillars’ defence assumptions of 1947 the Royal Navy now saw its role firmly established as the protection of sea communications against a Soviet air, submarine and mining offensive. This was emphasised in the Chiefs’ Global Strategy Paper of 1950. It became increasingly clear that with the growth of atomic stockpiles in the US and, it had now to be assumed, in the USSR, Britain and Russia would suffer severely during an intense initial phase of air bombardment at the outset of a war. It also became an article of faith for the Royal Navy that the war at sea, and especially the resupply of the UK, could continue in spite of this bombardment in what became known as a ‘broken-backed’ phase of the struggle. The activities of both sides during this phase might range from more or less energetic continuation of the war to recovery of strength or simply survival; any or all of these would require imports to the UK and therefore an anti-submarine campaign in the North Atlantic. Broken-backed warfare was described fairly consistently in defence documents of the early to mid 1950s:

A guiding principle of the rearmament programme should be to ensure survival in the short opening phase. Thereafter the effect of the atomic offensive will be apparent: if it has not been decisive, it will certainly be followed by a phase during which all forms of enemy attack will be much reduced, though perhaps less so at sea than elsewhere.

If no decisive result were reached in this opening phase, hostilities would decline in intensity, though perhaps less so at sea than elsewhere, and a period of ‘broken-backed’ warfare would follow, during which the opposing sides would seek to recover their strength, carrying on the struggle in the meantime as best they might.


Chapter 2: Broken-backed Warfare

There is the possibility that the nuclear battle might not prove immediately decisive, and in that event it would be of great importance to defend Atlantic communications against submarine attack.  

The intellectual origins of broken-backed warfare can clearly be traced in the ‘first thoughts’ outlined in chapter one: distrust of strategic bombing, confidence that atomic weapons could not be used economically or very effectively at sea and that strictly naval operations, including the protection of sea communications, would not be impossible in a future atomic war. Even as the burden of Korean War rearmament began to tell on the British economy, and pressure grew for a truly inter-service review of strategy, it proved possible to reconcile the Navy’s belief in the continued importance of sea communications with the RAF’s view, ably presented by Chief of the Air Staff Sir John Slessor, that future wars would consist in an immediate heavy bomber offensive. Slessor’s views were made more or less to dovetail with the Navy’s when the Chiefs met at Greenwich to draft the 1952 Global Strategy Paper. As a result most recent historians have dismissed broken-backed warfare as an inter-service contrivance: the First Sea Lord’s price for agreeing this paper. Slessor’s rather patronising opinion is frequently quoted: “The broken-backed war thing I never believed in, and neither did Bill Slim. But we had to put it in for the sake of little Rhoddy McGrigor because otherwise if there was no broken-backed war then there was no case for keeping a large Navy.” Other commentators have been equally dismissive: for Navias, “the need to appease Army and especially Navy sensibilities made it necessary in the 1952 [GSP] document to mention the so-called ‘broken-backed’ phase of global war.” For Grove, broken-backed warfare was “a relatively weak concept in itself,” and for Garnett, “most people thought the idea was obsolete even before it was formulated.” Perhaps this conclusion is inevitable in works concentrating on the commanding heights of the inter-service debates. We should be careful not to dismiss the still vivid memory of

4 Cmd 124, Defence: Outline of Future Policy 1957.

5 The 1952 Global Strategy Paper, COS(52)361 of 15 Jul 1952 in PRO, DEFE 5/40, has been greatly hyped by nuclear historians from Andrew Pierre onwards (“a classic among military documents” — Nuclear Politics, p.87), although Seldon’s account, heavily based on interviews, suggests that few people actually remembered it as a document of any great importance (Churchill’s Indian Summer: The Conservative Government 1951-55, pp.331-2 and note 29 p.598). Interest was stimulated further when the paper’s declassification became something of a cause célèbre. Baylis and Macmillan give a very balanced account however (Journal of Strategic Studies Jun 1993, pp.200-26): “those familiar with the secondary literature will find no major surprises in the 1952 Global Strategy Paper.” Julian Lider agrees with my assessment of the GSP as compromise (British Military Thought After World War II, pp.203-4).

6 In interview, quoted in Seldon, Churchill’s Indian Summer: The Conservative Government 1951-55, p.335 (Seldon detected “some exaggeration” in Slessor’s view, although more recent writers have tended to quote the passage without comment: e.g., Clark and Wheeler, The British Origins of Nuclear Strategy, p.172; Baylis, Ambiguity and Deterrence, p.144).

the Battle of the Atlantic however. This struggle had continued throughout the 'Phoney War' on land, and indeed threatened to become serious once again as late as 1945 with the entry into service of new fast U-boats. It was hardly ridiculous to suggest that a similar campaign could be necessary again, whatever the death and destruction meted out on land. Authoritative official bodies, Tizard's Defence Research Policy Committee in February 1952 and the Chiefs' Air Defence Committee the following month, drew just such a conclusion.\(^8\)

In the following several years a large 'global war navy' was built up of anti-submarine escorts, minesweepers and coastal defence vessels. Between 1950 and 1958, thirty-three wartime destroyers were converted into Type 15 and 16 anti-submarine escorts; six Type 12 and twelve of the more basic Type 14 anti-submarine frigates were built new and their Rothesay-class successors were ordered. Twenty Ford-class seaward defence boats and thirty-two Gay, Bold and Dark-class fast patrol boats were built. Almost 120 coastal and 100 inshore minesweepers of the Ton and Ham classes followed. It is significant that these unglamorous ships and boats attracted investment, rather than the big ship navy. Many of the minesweepers went almost straight into reserve, joining the very many wartime escorts and mine warfare craft dispersed around the creeks and inlets and minor ports of the UK to form the nucleus of a force which, when mobilised, could fight a third world war. A Board of Admiralty document listed 358 Reserve Fleet vessels in various states of preservation in 1956.\(^9\)

I hope to show in this chapter that broken-backed warfare was much more than an inter-service contrivance to present an appearance of strategic agreement, that it had some considerable intellectual and bureaucratic foundation, and above all that it was studied in great detail at the policy implementation level, not only by the Admiralty but also by civil departments. I shall end with the ferment caused by the hydrogen bomb and the renewed questioning of broken-backed warfare thereafter, and with the reluctant repudiation of the strategy in 1956-57. I shall not attempt to present a full and coherent account of naval planning, including for example control of shipping, convoy patterns and mine warfare, although all of these received detailed attention, and offensive plans will be covered in the next chapter. I shall concentrate instead on the specific defensive implications of atomic weapons. In a sense this will therefore be an account of the dark side of British defence planning in the 1950s: the consequences for ports, men, ships and shipping, especially in the waters around Britain, of prolonged global nuclear war.

The threat to ports: more information

We have seen that one of the principal threats immediately recognised by the Admiralty after Hiroshima was that faced by British ports, the vulnerable end points of the supply lines whose defence was now the Royal Navy's main business. The

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\(^8\) Clark and Wheeler, *The British Origins of Nuclear Strategy*, pp.54-6; Grove, *Vanguard to Trident*, p.84; PRO, COS(52)29th of 19 Feb 1952 in DEFE 4/52.

\(^9\) PRO, Board memo B1075 of 22 May 1956 in ADM 167/146; see also brief for ISL of 27 Jul 1954 in ADM 205/97, listing 481 vessels in total. For further details of the global war navy, see esp. Preston, 'United Kingdom' in Conway's *All the World's Fighting Ships 1947-95*; Friedman, *The Postwar Naval Revolution*, esp. table in app.5.
implications of this threat were later studied in detail. Some aspects of these studies had an interwar or wartime flavour, but there were also some new twists.

Civil defence studies of atomic attack on British ports were underway as early as 1946 for the Cabinet Home Defence Committee. Detailed interdepartmental work on the impact of an atomic attack on the UK seems to have begun only in 1948 however, when the Home Office-led Civil Defence Joint Planning Staff (CDJPS) spawned a working party on the effects of air attack. This working party began by looking at weapons effects in detail, rather than attempting to build up an overall picture of attack. In late 1949 it produced a study of the effects of an atomic attack on the London docklands. The study was quite sophisticated, assuming an attack with a number of bombs, not all of which landed accurately, and speculating on the effects of varying the height of burst: a lower burst would damage more heavy machinery, at the cost of less extensive damage to transit sheds and warehousing. The Ministry of Transport had helpfully pointed out that in the late war London, being on the east coast and exposed to enemy attack, had never operated at more than about twenty-five percent of capacity. This kind of throughput, it was concluded, could probably be resumed after an atomic attack with an interruption of no more than a week. A list of twenty-two ports likely to be the targets for atomic attacks in war had already been provided by the JIC to another civil defence body, the Port Emergency Planning Committee, whose work will be examined below. In 1951, the CDJPS working party produced its own list to model a twenty-bomb attack on the major cities of the UK – only one was not a port – which, it was thought, would kill 350,000 and injure a further 150,000 people. Several further studies were undertaken in the following years: during 1951 the working party looked in detail at the effects of notional attacks on Avonmouth and Liverpool, and a major civil defence exercise focussing on the Port of London was conducted in October 1953.

PRO, CDJPS(EA)(49)17 of Nov 1949, in HO 357/10, refers to a 1946 study of Liverpool, HDC(O)5, which apparently concluded that an atomic bomb would bring the port's operation to a standstill for a week, or in the 1¼ miles closest to the explosion for a month; CDJPS(EA)(50)18(Rev) of 30 Sep 1950, also in HO 357/10, refers to HDC(47)3, which appears to have examined the overall economic effects of an attack against British ports. The papers of the Home Defence Committee itself are still classified.

See the retrospective account in PRO, CDJPS(SI)35 of 11 Jun 1951 in HO 357/4; the working party's extensive papers are preserved in HO 357/10.

PRO, CDJPS(EA)(49)17 of Nov 1949 in HO 357/10.

See the Port Emergency Planning Committee's first progress report, PRO, CDJPS(50)14 of 28 Apr 1950 in HO 357/3.

PRO, CDJPS(EA)(51)14 of 29 Aug 1951 in HO 357/10. Towards the end of 1952, attacks against atomic air bases and centres of industry and population in the UK were also being suggested, but COS(52)673 of 10 Dec 1952 in DEFE 5/43 still regarded the major ports as the most dangerous target set.

CDJPS(EA)(51)1A of Feb 1951 (Avonmouth) and CDJPS(EA)(51)14 of 19 Jul 1951 (Liverpool) are in PRO, HO 357/10; papers on the 1953 London exercise, including its final report dated 7 Feb 1954, are in HO 322/196.
Methods of delivering atomic weapons against British ports other than from the air were also receiving attention during this period. Chief amongst these was the so-called 'Trojan Horse,' a Soviet or neutral merchant ship with an atomic bomb concealed in the hold. The possibility had been mentioned by Albert Einstein as early as 1939, and Michael Perrin, technical adviser to the Ministry of Supply's Controller of Atomic Energy, went so far as to describe it in September 1950 as the "most likely method" of delivering atomic weapons. The idea seems to have been raised seriously in Britain by the DRPC or the JIC in July 1950. An Imports Research Committee was established under MoD chairmanship and with wide inter-departmental membership, including the Admiralty. The difficulty was that there were "no practicable and efficacious steps" that could be taken in peacetime to prepare against this threat. In a period of increased international tension, it might be possible to redirect merchant ships or civil aircraft from 'hostile' countries to non-vital ports, or to refuse to allow them within ten miles of shore. But the impossibility of detecting an atomic bomb except by visual search might mean His Majesty's Customs and Excise investigating any and every "grand piano sized" package, a quite unrealistic task, if such an attack were to be foiled.

Correspondence on this subject was reopened by an article in the Daily Telegraph in February 1953 but a new report from the JIC, concluding that a Trojan Horse attack was unlikely, was greeted with some relief the following November. Often mentioned in the same breath as the Trojan Horse attack, but rather more likely to be countered successfully, was the 'sneak craft,' a midget submarine of the type used by the Italians against Alexandria, and by the Royal Navy against the Tirpitz, during the war. The Chiefs' Subcommittee for Air, Coast and Seaward Defences warned as early as 1947 that this type of craft might be used to deliver an atomic weapon.

Britain's first atomic test, Operation Hurricane in the Montebello Islands off Western Australia in October 1952, was designed specifically to simulate the possible effects of a Trojan Horse attack on a port, using a weapon mounted in the

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16 Einstein's letter to Roosevelt, urging him to develop the atomic bomb, is quoted in Hansen, US Nuclear Weapons: The Secret History, p.39; see also Boyer, By the Bomb's Early Light, p.35; PRO, Perrin in IR(50)1 of Sep 1950 in AVIA 65/2055.

17 PRO, VCNS to ISL 31 Jan 1951 in ADM 116/6087; a JIC report JIC(50)21 is referred to in AVIA 65/2055.

18 PRO, IR(50)7 of 29 Nov 1950; also COS(50)181st mtg of 17 Nov 1950, both in AVIA 65/2055.

19 It is interesting that similar problems bedevilled the naval arms controllers of the 1980s - see Lin, 'Verification of Nuclear Weapons at Sea' in Fieldhouse, ed., Security at Sea, esp. pp.105-10.

20 PRO, JIC(53)85 and JIC(54)23 are mentioned in AVIA 65/2055 and ADM 1/28924 respectively; see also discussion in the Lamplight conference papers in DEFE 7/2084.

21 PRO, COS(ACS)(47)43(Final) also COS(47)265(O) of 18 Dec 1947 in DEFE 8/3.
hull of the frigate HMS Plym. As early as August 1950, the object of the test had been described as “to ensure that the weapon functions correctly, with the important secondary purpose of taking advantage of the opportunity to discover the precise effects of an atomic explosion occurring in the hold of a Merchant Ship in one of our ports.” The Montebello Islands were favoured by the Admiralty as a test site because of the narrow channel of navigable water, similar to London or Liverpool. This was not the deciding factor in selecting the site – a political matter closely related to the perennial question of independence from the United States – but the concern was real. Cathcart relates this in part to the personal fascination of chief bomb designer William Penney with the ‘base surge’ phenomenon seen after the underwater burst at Bikini.

HMS Plym is often said to have been vaporised at Hurricane, although in fact after the test the nearby shore was streaked here and there with a “gluey black substance” which turned out to be the remains of the frigate. Various civil defence and military structures, including a ship’s funnel and deckhouse, had been exposed nearby, although unfortunately the funnel fell over and the effects of blast and shock were indistinguishable from the effects of its hitting the ground. There seems to have been no great hurry to incorporate the lessons of the test into the UK’s corpus of knowledge on weapons effects, perhaps because the JIC had now concluded that the form of attack it envisaged was in fact unlikely. The autumn 1953 Port of London exercise relied on Nagasaki and Bikini data, and Penney’s final report on the test was not completed for nearly two years after his return to the UK.

Rear Admiral Torlesse, the naval commander at the test site, was however tasked by the Chiefs with reworking the results of the earlier COJPS study on Liverpool, with special reference to “the problems of re-entry into a port after an atomic explosion.” Re-entry to the immediate area of the test had posed considerable problems at Hurricane, as at Bikini after the underwater test; Torlesse

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23. PRO, ACNS to ISL of 17 Aug 1950 in ADM 116/6087.

24. Cathcart, Test of Greatness, p.147; documents in PRO, ADM 116/6087, including DRP(AES)(50)1st mtg and Penney to ACNS of 25 Jul 1950, tend to support this view, as does Penney’s lecture at Exercise Trident in ADM 239/490; see also Gowing, Independence and Deterrence, Vol.2 pp.477-9.

25. Ibid.


27. Ibid.

28. The Confidential version of the Torlesse Working Party report is MISC/P(54)4 of 1 Mar 1954 in PRO, ADM 1/26944; a more highly classified version also existed, which related its results in detail to ports other than Liverpool, including some on the continent. See also COS(53)12th mtg of 26 Jan 1953 in DEFE 4/59, COS(54)12th mtg of 4 Feb 1954 in DEFE 4/68 and Head of M note of 2 May 1956 in ADM 1/26927.
had been forced to remain on the islands to deal with unexpectedly severe contamination, missing a press conference with Penney in London as a result. 29

The conclusions of the various port studies completed up to 1954 do not make particularly cheerful reading today, but were in no sense apocalyptic. The assumption that an air burst attack was more likely survived the Hurricane test. In fact an air burst would maximise destruction of ships and port infrastructure by blast and flash, and the Avonmouth study in particular emphasised the capacity of the air burst to raise fires over a large area, posing a special threat to oil terminal facilities. 30 In any port, all buildings, bridges, dockside cranes and lock gates within a quarter of a mile of ground zero would, it was found, be destroyed by blast, and ships within this range would be sunk by blast damage at the waterline. Damage to similar structures would be extensive out to half a mile; ships would be disabled and cranes overturned. At ranges of three quarters of a mile, damage would be lighter and although buildings, and especially their roofs, would be damaged probably beyond repair, bridges, dock gates, ships and heavy plant would be likely to survive. Combustible material would catch light at up to 1½-mile ranges but many port areas were lightly built up and firebreaks existed, including many established during the late war. Penetrating radiation from an air burst would be a serious hazard, but contamination would not. The 1951 Liverpool study did look in detail at the implications of an underwater burst and the greater contamination which would result if the base surge developed as at Bikini, but the Port of London exercise in 1953 still assumed that residual radioactivity – after an air burst – would pose little danger to subsequent civil defence activity. 31

A particular concern in all of these studies was the danger to dock and lock gates and impounding plant, irreparable damage to which would make dock basins tidal and cause further problems as ships settled and listed. By 1953, a spare set of gates had been provided for the entrance of the King George V dock in the East End, a measure also urgently recommended elsewhere. Dock workers would need shelters, which remained in many cases from the late war, or casualties from all causes would be much increased. Navigation would be affected by the presence of wrecks in narrow channels and debris thrown into docks; transit sheds, railways and roads would be destroyed or blocked; food industries nearby such as granaries and processing plants would suffer. Essentially, all the studies agreed that serious disruption would result. Two accurately aimed air bursts could destroy seventy percent of Liverpool’s importing capacity; one underwater burst might destroy twenty percent, principally through wave damage to waterside facilities. Either explosion would kill most of an entire shift of dockers if warning or shelters were inadequate. Six months might be required if new gates for the Gladstone Dock had to be built from scratch, although the recovery period would be less if a spare set were to hand. The Torlesse study in 1954 noted that consideration was now being given to expenditure on such a measure. 32 Avonmouth’s oil import capacity would

29 Cathcart, Test of Greatness, pp.264-5.
30 PRO, CDJPS(EA)(51)1A of Feb 1951 in HO 357/10.
31 PRO, CDJPS(EA)(51)10 of 19 Jul 1951 in HO 357/10; papers in HO 322/196.
32 PRO, MISC/P(54)4 of 1 Mar 1954 in ADM 1/26944. (It is not clear whether spare gates for the Gladstone Dock were in fact ever completed).
be eliminated unless emergency pipelines to an offshore jetty or prepared anchorage were provided for outlying tank farms at some distance from the port itself. The Port of London would be more resilient: limited shipping movement could be expected only forty-eight hours after the attack, and full movement after a week; fifty-four shipping berths might be put out of action, but only eleven of these permanently; single-line rail communication might be re-established within a week. In general, the Port of London was so large, stretching for twenty-five miles from London Bridge to Tilbury and Gravesend, that a single bomb would cause only localised disruption. For Liverpool, Torlesse concluded that:

In the event of one accurate air-burst on the Liverpool Docks, more than half of the dock area (actually about 7000 yards of frontage out of a total of 11,000 yards) would be working within a few days. The remainder could be restored to fifty per cent working in three to four months assuming the necessary effort in men and equipment was made available and that spare lock gates were available to replace any destroyed. In the event of an under-water burst the consequences can be less clearly defined. It is possible for a large part of the dock area to be contaminated to such an extent that less than half the area could be re-entered for full-time work in the first seven weeks and parts of the docks might not be usable for months or years. This disaster could, however, only occur with the wind blowing straight along the waterfront and an accurately placed bomb up wind of the docks.

Indeed, the accuracy assumptions underlying all of this work were important. The 1951 studies both made the point that worst-case assumptions had been used and that an aiming error of, say, half a mile would mean only an eighty percent chance of a catastrophic fire at Avonmouth, and only a twenty-five percent chance of the full seventy percent reduction in capacity at Liverpool. With hindsight it is far from clear that even this half-mile accuracy would have been achieved by the Russian bomber force. Bomber Command’s accuracy had been extremely poor at times during the war, and one of the Americans’ best aircrews managed to miss by half a mile at Bikini “despite numerous practice runs, a brightly painted target, precise coordinates and optimal visual aiming conditions.”

The threat to ports: countermeasures

Like any self-respecting bureaucracy, the Admiralty was careful to delimit its role in countering the various threats to UK ports, especially where expenditure was concerned. The defence of ports against air attack was up to the RAF. Civil defence, broadly speaking, was a Home Office responsibility, although in ports and harbours the Ministry of Transport also had a role and naval bases were a special case. All naval officers received a certain amount of civil defence training in recognition of the Navy’s responsibilities there. The Admiralty also sent observers

33 ibid. The assumption of effort in men and equipment being made available is interesting; only in the later 1950s did sophisticated studies begin on the knock-on effects of attacks in various parts of the UK on the prospects for mutual assistance.

34 Weisgall, Operation Crossroads, p.189.

to the CDJPS, and representatives at Captain and Commander level of D of P(Q) appear in civil defence documents. By 1951, eight officers from the retired list were being trained as Admiralty Liaison Officers to work in wartime alongside local civil defence Group Controllers as representatives of the Cs-in-C of home ports. Group Controllers would have no responsibility as such over naval personnel, but could use these liaison officers as a channel to call for naval assistance.36 At the start of 1953 the Board of Admiralty discussed the appointment of Admiralty Regional Controllers in line with a new overall civil defence plan, which foresaw the delegation of authority for the control of industry, and in extremis the government of the country, to regional level. These Regional Controllers would be responsible for the organisation of ship repair and construction, a role later defined and expanded to include: local coordination and support for the Admiralty's industrial effort in the region; contact with other government departments and inter-departmental regional committees, for example on the flow of materials for shipbuilding and ship repair; civil defence involving Admiralty establishments and Admiralty-sponsored industries; and the coordination of naval assistance to civil defence. Post-holders would be active or retired flag officers, or perhaps important industrialists and shipbuilders.37 Clearly the Admiralty kept a watchful eye at working and policy level on developments in civil defence.

The report of the 1953 Port of London exercise perhaps gives the best insight into the measures that could have been taken in the face of atomic attack. It describes arrangements for fire-fighting; salvage and emergency communications; policy for shelters and so-called 'mobile columns' of deployable civil defence personnel; organisational structures, including those controlling ships in port; and structural precautions including, as already noted, the provision of spare dock and lock gates. With this detailed work and the relatively successful experience of wartime civil defence behind him, the General Manager of the Port of London Authority was able to conclude that:

However serious . . . the local effects of the explosion of an atomic bomb may be we must not overestimate the damage and think that nothing can be done. We have seen that casualties can be minimised by the use of adequate shelter accommodation, and that the resulting material devastation to buildings by fire can be localised and reduced by the bricking up of window openings where practicable, and by whitewashing windows that cannot be enclosed, as we found in the last war. Prompt fire-fighting measures are also essential . . . blast damage to roofs and machinery and plant can be countered by energetic repair action.38

The purely military defence of ports against the midget submarine and other seaborne threats was more obviously an Admiralty responsibility. At the start of 1947, the Chiefs created a subcommittee for air, coast and seaward defences to coordinate work on the defence of ports in particular, with D of P(Q) the Admiralty

36 See papers in PRO, ADM 1/23528.
37 PRO, Board memo B917 and minute 4796 of 22 Jul 1954 in ADM 167/144; memo B810 and minute 4635 of 22 Jan 1953 in ADM 167/143.
38 PRO, final report dated 4 Feb 1954 in HO 322/196.
Chapter 2: Broken-backed Warfare

representative. The papers of this committee over the next decade covered all manner of subjects, ranging from broad policy issues in air and seaward defence to the reconstitution of the wartime mine-watching organisation, the compilation of huge lists of 'key points' and 'vital targets,' and trials of new inventions such as the anti-submarine magnetic anomaly detector. Ports appear to have been given the highest priority for defensive measures in these years, above RAF bomber bases. Seaward defence of ports was re-examined in detail for the first time since the war in a report for the Chiefs in December 1947. During the war, protective nets and booms, magnetic induction loops, harbour defence asdics, remote controlled minefields and a large class of harbour defence motor launches had been built. Enough such equipment and craft were still stockpiled in 1947 to protect perhaps twenty ports, but future developments including light indicator nets, specialised radars, American sonobuoys and fixed anti-submarine mortars were also expected to become available. Over the period 1949-54, as Friedman records, “extensive fixed defences” were constructed in a number of ports and coastal areas:

Portsmouth, Devonport, Milford Haven, Belfast, the Forth, the Clyde, Loch Ewe, the Tyne, Scapa Flow, the Thames, the Humber, Dover and Harwich. New ideas emerged, including shore-mounted mortars to fire automatically against contacts revealed in the magnetic loops. New seaward defence boats, the Ford class, were also built. By 1954 there was a growing realisation however that many of the protected ports were also on the expected target lists for atomic bombing, and that fixed seaward defences could not protect every possible smaller port and anchorage. D of P took advantage of the Chiefs’ having raised a squabble over responsibility for coastal artillery to review future seaward defence policy. It was manifestly impossible to provide seaward defences on a reasonable scale to all ports and anchorages, or even to predict accurately which would require such defences in the broken-backed phase, so redeployable emergency stocks of equipment were now suggested: transportable nets and radars, ‘port emergency asdics’ and sea and air patrols were to be preferred over fixed loops, booms and sensors.

Indeed, whatever the civil and military defence precautions taken, it was clear from a more general standpoint that prewar patterns of trade would be seriously affected by atomic attack, as they had been during the conventional blitz of the late war. Investigations therefore also proceeded, under the umbrella term ‘Port Emergency Planning’ or PEP, into the implications of the outright loss of the major

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39 PRO, COS(ACS) papers in various DEFE 8 files, e.g., vital target lists down to individual cold stores, granaries and municipal power stations in British ports in the ‘Vital Targets Subcommittee’ papers for 1953-54 in DEFE 8/15.

40 Papers in PRO, DEFE 8/15 plan for heavier anti-aircraft gun defences around ports than airbases; by 1952, however, the two categories were more equal in priority – see e.g., JP(52)78(S)T of R of 26 Jun 1952 in DEFE 6/21 and COS(53)606 of 22 Dec 1953 in DEFE 5/50.

41 PRO, COS(ACS)(47)43(Final) also COS(47)265(O) of 18 Dec 1947 in DEFE 8/3.

42 Friedman, The Postwar Naval Revolution, pp.209-11; see also papers in PRO, ADM 1/24060 and ADM 1/24115.

43 See papers in PRO, ADM 1/28924 (the wartime term ‘asdic’ had yet to be replaced by the Americanism ‘sonar’).
ports of the UK. Those working on PEP had prewar forerunners, originally appointed in 1934 by a Committee of Imperial Defence anxious about the German bomber threat. Their postwar incarnation came in response to calls from the Cabinet Civil Defence Committee in March 1948 and the Chiefs in April 1949: "The problem of operating ports under heavy air attack and of alternative methods of discharge and of distribution of cargoes should be examined as a matter of urgency." Finally in November 1949 a PEP Committee was set up under the auspices of the CDJPS and with a Ministry of Transport chairman. The Committee's terms of reference were:

1. To assess the minimum essential requirements in respect of import and export capacity which will be vital to the UK in time of war.
2. To examine the methods whereby those minimum requirements can be met in the face of any anticipated enemy attack on our port and storage installations and sea and land communications.
3. To make recommendations through the Civil Defence Joint Planning Staff to the Official Committee on Civil Defence in respect of the various measures, including constructional works, provision of craft and equipment, and the executive organisation necessary to ensure the attainment of this objective.

The Admiralty was among seven government departments represented on this committee, and provided three officers, one RNVR and two from the retired list, for a supporting staff manned jointly with the Ministry of Transport. They were directed to liaise with the Sandstone staff, who since 1947 had been conducting within the Admiralty a complete survey of the UK's beaches from the three-fathom line offshore to road and rail access points inland.

A first PEP progress report was provided to the Chiefs in April 1950, listing annual import requirements in a future war and the likely operational constraints on their achievement, including Admiralty estimates of the Navy's ability to keep ports and coastal convoys running, and the JIC's assessment of likely atomic attack. Analysis then began of the throughput that could realistically be expected from the remaining ports, and of measures to increase the capacity of secondary ports and sheltered anchorages for overside discharge into coastal shipping or lighterage.

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44 Prewar PEP work is described in Behrens, Merchant Shipping and the Demands of War, pp.24-34; see also PRO, CDJPS(50)14 of 28 Apr 1950 in HO 357/4, and Howarth and Law, eds., The Battle of the Atlantic 1939-45, pp.35-6, 164/9. During the war, ship handling arrangements especially in the Clyde, Mersey and Bristol Channel prefigured some of the postwar PEP work — see Behrens, op.cit., pp.134-7.

45 PRO, JP(48)65(Final) of 31 Mar 1949 in DEFE 6/6; see also discussion in COS(49)55th mtg of 13 Apr 1949 and 62nd mtg of 29 Apr 1949 in DEFE 4/21, and CDJPS(49)72 of 5 Aug 1949 in HO 357/2 which refers to CDC(48)1st mtg of Mar 1948.

46 PRO, CDJPS(49)16 of 4 Nov 1949 in HO 357/2.

47 PRO, CDJPS(49)72 of 5 Aug 1949 in HO 357/2. The Sandstone staff had an interesting history, apparently originating with an American request to look at possible re-entry points into a future Britain under Soviet occupation. Its copious papers are in the ADM 326 series; some history can be found in ADM 326/1 and the beach survey for Cleethorpes with map, cross-sections and photographs is in ADM 326/125. The Sandstone papers cover the period up to 1970 in some cases.
Communication between minor ports and nearby anchorages, clearance inland of minor ports and the availability of coastal shipping all received attention, and a list was drawn up of promising secondary deep-water ports and anchorages. Britain's numerous minor ports were however decaying economically and oil facilities in particular were already heavily concentrated in threatened major ports. By September 1950 further progress had been made. A reconnaissance of 181 ports, harbours and piers was complete, £6 millions of works had been recommended and it was thought realistic to plan "improvised means of dealing with some 150 ocean-going vessels and something in the order of twenty million tons of cargo annually." By February 1951 detailed study was underway of the mooring gear required in emergency ports. Special studies were begun later in the year into the use of the Thames, Clyde and Merseyside areas in war, and Treasury approval was obtained for £4 millions of expenditure, although the dollar cost element of this remained subject to dispute. Bulk grain handling, edible oils and the petroleum industry were examined in detail and the two studies of weapons effects on Avonmouth and Liverpool, described above, were sponsored.

Some in the Admiralty and the staffs of the naval Cs-in-C were now concerned about possible conflicts between PEP and other plans. earmarking the Gareloch and Holy Loch as emergency ports, for example, would conflict with a peacetime degaussing range and buoys maintained for submarine trials; there were similar problems at Milford Haven, Holyhead, Falmouth and elsewhere. Reassessment of the danger of mining in future war meanwhile suggested severe restrictions on shipping movements between Spurn Head and Eastbourne, which would also affect PEP. Interested parties in the Admiralty staff divisions met in November 1951 and were due to meet Ministry of Transport counterparts early the following year, although no record of these discussions appears to have survived.

Another concern emerged in 1953 after Exercise Mariner, which highlighted the demands placed upon the Firth of Clyde by NATO plans. Flag Officer Scotland's representative told a large meeting that "not only would the Clyde be the major naval base in the UK [for the NATO Striking Fleet], but it was also a principal military sea transport and loading port, a convoy terminal and assembly port anchorage, and within the Clyde area generally, there were numerous minor ports which were being developed by the Port Emergency Planning Committee as part of their emergency linked ports system." C-in-C Home and FOS both evidently

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48 PRO, CDJPS(50)14 of 28 Apr 1950 in HO 357/3.

49 PRO, CDJPS(50)26 of 7 Sep 1950 in HO 357/3.

50 DTD, rather than D of P(Q), was now the Admiralty's PEP representative; see PRO, docket M.061156151 of May 1951, 'Interim Report of PEP Committee - Recommendations' in ADM 1/24409.

51 PRO, DTC(51)41 of 16 Nov 1951 in ADM 1/24409. PEP work had now been resubordinated to the Defence (Transition) Committee (see CDJPS(51)49 of 2 Oct 1951 in HO 357/4). This is unfortunate for the historian: the DTC remains a very shadowy organisation, its files still classified except for a small number relating to the Suez crisis in CAB 134/815; its role appears to have been to plan the mobilisation of the British population and economy in the event of war.

52 See later papers in PRO, ADM 1/24409.
thought that PEP requirements should take second place; this would make the Clyde a special case. They also complained that the PEP Committee "were planning for an emergency which might never occur."\textsuperscript{53}

It is clear meanwhile that PEP work was not confined to the UK. C-in-C Middle East replied in March 1950 to an enquiry from the Chiefs about the operation of ports under heavy air attack and the possibility of alternative discharge and distribution of cargoes in Egypt. Alexandria and Port Said were vulnerable to well placed atomic bombs, as was the Canal; the port of Suez however had fairly widely dispersed facilities, and stores could be landed at various points along the coast between Sollum and Alexandria or in the Gulf of Suez. C-in-C Middle East's assessment was not sanguine at this stage, but in 1956 the Admiralty suggested on the basis of the Torlesse report and comments from DOR that accuracy considerations in particular actually made the Canal relatively safe from attack.

Four to eight weapons in the megaton range might be required in order to be ninety-five percent certain of cratering the canal bottom, and even then it could be open again after only three months of dredging operations.\textsuperscript{54} Work on PEP continued for many years. The Ministry of Transport evidently planned for and developed mobile cranes and grain handling facilities during the 1950s, and extended its work to cover Gibraltar, Malta and no doubt other overseas locations as well as ports and anchorages in the UK. Papers were still being produced in 1972.\textsuperscript{55}

Thus, building on wartime work on the control and diversion of shipping and the inland clearance of cargoes, a great deal of work eventually went into schemes to keep imports flowing in a broken-backed war. Parliament was given progress reports, for example in 1955:

\begin{quote}
A large part of the imports into this country enters through the major ports which are vulnerable to thermo-nuclear attack. Plans have therefore been drawn up for the provision of alternative facilities, including the use of smaller ports and harbours. Much practical work has been done to implement them. These arrangements cover dry cargo and oil and take account of the internal distribution of cargoes once landed.\textsuperscript{56}
\end{quote}

The major ports of this country are vulnerable to nuclear attack, and plans have been made for the provision of alternative port facilities. The advent of the megaton bomb has, of course, made this more necessary than ever. These plans have gone beyond the paper stage; in suitable places additional quays and jetties are being built, and disused ones restored. Dredging inside some of our smaller harbours and in their approaches is being put in hand. Equipment has been provided, including a reserve of mobile cranes and plant for handling grain. Attention is also being paid to the special problem of rehabilitating ports after attack, and plans are being made for the provision of a pool of mobile equipment.

\begin{flushleft}
\textsuperscript{53}PRO, notes of meeting held 19 Nov 1953 in ADM 1/24650. It is interesting that C-in-C Home and FOS thought the use of the NATO Striking Fleet more likely than atomic attack on the Clyde area, but this assessment appears not to have been conscious.

\textsuperscript{54}PRO, COS(50)77 of 1 Mar 1950 in DEFE 5/20; note of 17 Aug 1956 in ADM 1/26927.

\textsuperscript{55}See PRO, class list for MT 82 series.

\textsuperscript{56}Cmd 9391, Statement on Defence 1955.
\end{flushleft}
such as generators and pumps, which would be stored away from target areas until it was needed.\textsuperscript{57}

The threat at sea

With the early 1950s came a growing realisation that atomic weapons could in future pose a threat to ships at sea, as well as in port. In the late 1940s, as we have seen, it had been thought that it would be uneconomical to use atomic weapons at sea. It is difficult to see exactly when this conclusion was first challenged. The first Soviet test in September 1949, leading to an increase in estimates of the likely Soviet atomic stockpile, is one possible watershed, but it is also possible that there was no single decision point. The shore establishment HMS \textit{Phoenix} was commissioned to combine damage control, fire-fighting and Atomic, Biological and Chemical Defence (ABCD) responsibilities in 1949.\textsuperscript{58} Gamma-ray irradiation trials took place on the cruiser HMS \textit{Arethusa} off Spithead during the summer of 1949, although few details are available of these experiments.\textsuperscript{59} Admiralty correspondence on the subject of ABCD seems to have begun in earnest during 1949-50 with consideration of ‘safe doses’ of gamma radiation and the problems of contamination of ships with fission products after an underwater explosion. ‘Atomic Defence Progress Meetings’ began in the Admiralty, and by May 1950 were discussing the provision of radiation monitoring equipment and training for its use, listening to information on base surge effects and planning radiological safety courses.\textsuperscript{60} By September 1951 the first ‘ABCD Books’ for HM Ships were in draft and an official paper had been circulated entitled ‘ABCD – Protection of Ships Against Atomic Attack (Air Burst).’\textsuperscript{61} HMS \textit{Eagle}’s ABCD book survives dated December 1951; it is a beautifully printed foolscap compendium of the ship’s damage control arrangements in her original condition.\textsuperscript{62}

At this stage the Navy was working to a 1948 Board ruling that “no modification to design of equipment or ships should be made solely on account of atomic warfare, unless this can be carried out without decreasing the fighting efficiency of the ship against conventional forms of attack.”\textsuperscript{63} Nevertheless a good

\textsuperscript{57} Lord Carrington, in House of Lords debates Vol.194 col.220.

\textsuperscript{58} Warlow gives the date of 1949 in \textit{Shore Establishments of the Royal Navy}, although the \textit{Navy Lists} suggest that a couple of officers were appointed there in 1948. Admiral Sir Frank Twiss gives an account of the very earliest ABCD work: “What would really have happened was anybody’s conjecture. The one thing you couldn’t do, was to say you couldn’t do anything about it” (Howard Davies, \textit{Social Change in the Royal Navy 1924-70}, pp.113-20).


\textsuperscript{60} PRO, record of 7th Atomic Defence Progress Meeting of 11 May 1950 and other papers in docket ACNS/22A/49 in ADM 1/25258.

\textsuperscript{61} Mentioned in PRO, DZ055/52 in ADM 1/26416.

\textsuperscript{62} PRO, CB.4538A ABCD Book \textit{HMS Eagle}, ADM 239/427.

\textsuperscript{63} PRO, note of 12 Oct 1948 in ADM 1/25258.
deal of thought had been given to the problems of atomic defence. Dust and spray
had to be excluded where possible from the ship and this, it was hoped, could be
achieved with ventilation measures, closure of doors and hatches, and covering of
equipment difficult to decontaminate. Compartments within the ship were divided
for ventilation purposes into five groups ranging from those where fans had to run
continuously, including engine rooms, to those where ventilation could be
temporarily stopped or recirculation applied, and those which were to be fully air-
conditioned, like the Action Information Centre and sick bay. Hosing down would
remove radioactive deposits; radiation exposure of individuals would be monitored
and communicated to command and medical authorities. Radiac instruments for
naval use were not yet in production; in the absence of personal dosimeters, crew
identity discs might have to give the location of the nearest recording instrument to
facilitate more general estimates of dosage. Shielding from the effects of gamma
radiation could be found between decks, below the waterline and "on the side away
from the explosion." Protection against flash, blast and large waves, possibly
breaking over the ship's superstructure, were already a part of the damage control
arrangements of any warship and not therefore specifically covered by ABCD;
damage control had been dear to the hearts of many in the Navy ever since the
embarrassing losses at Jutland and, in the Second World War, the sinkings of the
Hood and the Ark Royal, the latter only twenty-five miles from safety in Gibraltar. During 1952 the opportunity was taken to exchange information with the
US Navy on decontamination trials, and a copy of the Sixth Fleet's 'Operational
Atom Bomb Defence Plan' was obtained By the following year attention was
being paid also to ABCD for merchant ships. A 'Merchant Ship ABC Defence Sub-
committee' of the government-industry Shipping Defence Advisory Committee was
set up in July "generally to provide shipowners with technical information on the
defence of Merchant Ships at sea against atomic, biological and chemical warfare in
all its aspects," including equipment requirements. The Royal Navy had welcomed
Merchant Navy navigator and engineer officers onto ABCD courses as early as
1949, but apparently only announced in 1953 that the threat from atomic bombs
applied at sea as well as in port.

Over the following two years ABCD doctrine was developed still further. A
long series of experiments involving HM Ships all around the world was undertaken
in response to a June 1953 Admiralty circular asking for reports on the practical

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64 PRO, CB.4538A ABCD Book HMS Eagle, ADM 239/427.
65 See e.g., Admiral Vian's speaking notes for the Trident conference in 1949: Friedman,
The Postwar Naval Revolution, app.3.
66 PRO, BJSM note of 17 Feb 1952 in ADM 1/26416 and docket TSD168/54 in ADM
1/25258.
67 See papers in PRO, ADM 1/25793; this is the only record I have found of a positive
official decision that the threat of atomic attack now existed at sea; the authority is a
director of Cunard rather than an Admiralty official. Tom Pratt also suggests that as late
as 1952-53 the threat to a convoy from atomic weapons was discounted - see 'A Rose By
Any Other Name, Pt.1' in Journal of Naval Science Jan 1981, p.4. Advice to the
Merchant Navy on ABCD continued for many years - see e.g., Wettern, The Decline of
British Seapower, p.163.
implications of contamination from an underwater burst atomic attack on the fleet.\textsuperscript{68} In November 1953 C-in-C Far East Station, for example, directed a series of timed experiments in getting personnel from their normal stations to relative safety down below in the event of attack. The reports of HMS \textit{Consort}, \textit{Defender} and \textit{Newcastle} showed that closure of all ventilation and knowledge of routes below were key factors, but that the possibility of structural damage below the waterline made the process of dodging contamination in some sense a game of double jeopardy. HMS \textit{Newcastle}’s report includes a fine series of diagrams of the progress, minute by minute, of one such experiment.\textsuperscript{69} Ultimately these trials suggested that a ‘shelter’ procedure was practicable in all ships, preferably in two stages, with personnel heading first into the gas citadel and then progressively further down below. The waterline, however, would be the only defence in smaller boats and craft. Gastight and watertight integrity, communications and the ability to steam and con the ship were conflicting requirements in an atomic emergency however: for example if, as seemed likely, nuclear weapons were only to be used “against a concentration of ships such as a convoy,” the vessels would have to be coned in the immediate aftermath of the explosion simply in order to avoid collision. This required in turn a minimum of personnel to remain exposed.\textsuperscript{70} Machinery spaces also posed problems since much air needed to be drawn in, both for combustion and for comfort ventilation. Crash stopping of boilers in an ABC emergency was investigated, since otherwise crew endurance in hot and airless machinery spaces would be very limited – as little as fifteen to thirty minutes. On the other hand C-in-C Portsmouth suggested, on the basis of existing knowledge of the base surge and fallout phenomena, that a ten-minute ‘danger period’ of high initial radiation would be followed by a period of lesser radiation hazard during which only lengthy exposure of personnel would be dangerous.\textsuperscript{71} During 1954, the first ‘washdown’ experiments including pre-wetting of exposed surfaces took place on the trials cruiser HMS \textit{Cumberland}; the Montebello Islands test had proved the value of such procedures in fighting contamination.\textsuperscript{72} By 1956, when a new ABCD book was issued for HMS \textit{Ark Royal} after her first refit, there had been a number of changes in thinking. Pre-wetting was firmly part of the drill for decontamination. Machinery spaces had been removed from ventilation group one, in which fans had to run continuously, and modifications to trunking had been made which would allow instead the recirculation of air with only a brief interruption to supply. Primary and secondary ABCD headquarters on the ship, with electrically independent communications systems, had been designated. Greater attention seems also now to have been given to individual protection, with

\textsuperscript{68} PRO, M/DZ055/52 of 12 Jun 1953, preserved along with voluminous related correspondence and details of the trials in TSD2/54 in ADM 1/26416.

\textsuperscript{69} PRO, TSD59/54, HMS \textit{Newcastle} report of 31 Dec 1953 in ADM 1/26416.

\textsuperscript{70} PRO, draft letter from HMS \textit{Phoenix} of 4 Jun 1954 in ADM 1/26416.

\textsuperscript{71} PRO, note of 14 Oct 1953 on docket TSD109/54 in ADM 1/26416.

\textsuperscript{72} For HMS \textit{Cumberland}, see \textit{Brassev’s Annual} 1955, p.339; \textit{Wettern, The Decline of British Seapower}, p.99; PRO, DPR note of 11 Nov 1954 in ADM 1/26416; for Montebello, see MISC/P(54)29 of 27 Aug 1954 in AIR 8/2309.
allowances of radiac instruments available and ‘cleansing posts’ set up within the ship. Not all of HM Ships had such comprehensive facilities, but more guidance had been circulated widely with the issue in 1956 of an ‘ABCD Manual’ and an ‘ABCD Handbook.’

Not only did the mid-1950s see a revolution in ABCD arrangements for individual ships, but investigations continued into the correct tactical countermeasures to be adopted by a group of vessels in the face of attack. Up to 1955, standing instructions to ships in convoy, for example, were to steer directly away from surface zero or, if they were downwind of any contamination, at right angles to the wind. An exercise led however to a suggestion from DTSD that attention should be given to the idea of a moving rendezvous or ‘point Z’ around which a convoy should reform after an attack. Point Z needed to be away from the convoy itself and upwind, such that both it and the convoy could not be endangered by a single burst. It also however had to move with time, since ships arriving could not remain dead in the water but would need steerage way to resume their course safely. The difficulty of this procedure in the confusion, demoralisation, possible blindness and lack of communications following an attack was not disregarded. Individual evasive manoeuvres would clearly be dangerous however, and so eventually a single emergency turn was recommended wherever possible instead of a point Z procedure.

The hydrogen bomb

The possibility of a thermonuclear or hydrogen bomb, orders of magnitude more powerful still than the atomic bomb, was known during the war to British scientists, and it was mentioned in discussions during 1945 and 1946 on fissile material requirements and the siting of British reactors. After considerable internal debate, the US decided to pursue the development of a hydrogen bomb in January 1950, at which point President Truman announced the decision publicly. UK government papers and indeed articles in the press mentioning the H-bomb appeared soon

73 PRO, CB.4538D ABCD Book HMS Ark Royal dated 1 Nov 1956, ADM 239/430.
74 HMS Centaur’s arrangements after her 1956-58 refit were “rudimentary” – see Friedman, British Carrier Aviation, p.312, and PRO, Board minute 5001 of 3 May 1956 in ADM 167/146; a copy of the ABCD Handbook, BR.2171, has survived as ADM 234/574 and includes an introduction on nuclear physics, a compendium of weapons effects including some of the earliest British information on deep underwater bursts, and a guide to radiac instruments.
75 PRO, TSD paper of 9 Nov 1955 and staff divisions’ comments in ADM 1/26425.
76 Szasz, British Scientists and the Manhattan Project: The Los Alamos Years, notes that three members of the British mission, Egon Bretscher, Anthony French and Michael Poole, worked with Edward Teller on the ‘super’ during the war; see also Gowing, Independence and Deterrence, Vol.1 pp.166, 173.
77 Rhodes, Dark Sun: The Making of the Hydrogen Bomb, p.407 (the ‘Teller-Ulam’ idea which actually made the hydrogen bomb possible was still a year away).
thereafter. Fusion fuel was first added to improve the efficiency of a fission weapon in a US test in May 1951, and in November 1952 the US tested the first true thermonuclear device, ‘Ivy Mike,’ at Eniwetok. The time difference meant that Britain was, symbolically, rather behind: it was still October by Greenwich Mean Time. Knowledge of the test was also at first extremely limited, and it is far from clear that anyone in the UK was officially aware of what had happened. In 1951, and right up to the end of 1952, Penney and Cherwell, though keen to pursue the idea of an H-bomb, repeatedly cautioned that its feasibility had not been demonstrated and that effort would be difficult to spare in the UK. Leaks about the US test did begin almost immediately, with newspaper stories, an article in the Bulletin of the Atomic Scientists and press releases confirming that “experiments contributing to thermonuclear weapons research” had taken place. Strategic thinking about the hydrogen bomb did not however begin in earnest until the full success and implications of the Ivy Mike test were officially announced by President Eisenhower in February 1954, just as the earliest weaponised H-bombs were entering the US stockpile. The runaway ‘Castle Bravo’ test at Bikini the following month, and the outcry over the contamination of the Lucky Dragon, finally catapulted the H-bomb into the headlines worldwide. With pressure growing for a test ban, the Americans in effect forced the Churchill government into its own H-bomb ‘decision,’ ratified by the full Cabinet on 26 July 1954. This conjunction of events, and not the initial American test or even the Soviet test of an weapon with some thermonuclear yield in August 1953, seems to have provoked the first serious thought in the UK about the implications of the hydrogen bomb.

The Chiefs endorsed a ‘thermonuclear appreciation’ in June 1954. Whilst certainly not abandoning broken-backed warfare, they suggested that under thermonuclear attack the UK could no longer remain a ‘main support area’ for Allied operations, and also that British defence policy should in future emphasise “our [peacetime] position and influence as a world power and our capacity to discharge our Commonwealth and Colonial responsibilities,” rather than global war capabilities. This represented a dramatic change from the 1952 Global Strategy Paper assumptions. A review of broken-backed warfare capabilities was directed, although D of P was able to reassure an Admiralty audience that, even if requirements for the post-nuclear phase were reduced to bare survival, and even cold-bloodedly taking into account the likely reduction in “hungry mouths” in Britain, large and indeed increasing numbers of anti-submarine escorts would still be required. Only “new” techniques, including attack at source, transit offensives and

78 DEFE 7/906 and DEFE 7/2208 are both still classified, but the PRO class list shows they contain papers on the H-bomb dating to 1950; see also Wansbrough-Jones, ‘Present Science and Future Strategy’ in Journal of the RUSI Aug 1950, pp.410-1.


fixed underwater sonars, could alter this conclusion.\textsuperscript{82} The politicians nevertheless quickly grasped the possibility of financial savings in the new circumstances, and a ministerial committee under Lord Swinton was set up to look in particular at reducing naval expenditure requirements, reporting in November but failing to make very much headway except in the area of mine warfare.\textsuperscript{83}

The Navy also began to look itself at the direct effects of thermonuclear weapons. Information was scant at first, but by June 1954 a rudimentary series of estimates had been made of likely ranges of damage. Carriers could be sunk at a range of a mile by a two-megaton weapon, and merchantmen at twice that range. Most ships would be immobilised at 4600 yards, structural damage would extend to 6900 yards – further for flimsy radio aerials – and heat could cause casualties at six miles on an exceptionally clear day, even in anti-flash gear. These were very significant increases over the twenty-kiloton ‘nominal’ atomic bomb, and it was clear that greater tactical problems would immediately result: carriers, for example, would have to sail in distant company seven miles apart to avoid more than one’s being badly damaged by a single bomb.\textsuperscript{84} The Naval Staff’s reaction was to set up a Hydrogen Bomb Working Party chaired by DTSD, whose aim was to provide a thermonuclear companion paper to the 1952 ‘Naval Aspects of Atomic Warfare.’ The Working Party first met in February 1955 and by September had produced an Admiralty Fleet Order for circulation entitled ‘ABCD – Megaton Explosions at Sea – Effects and Defence.’ Some more assumptions had been made about the threat: a carrier task group might be a worthwhile target for an H-bomb, representing as it did a direct threat to the USSR, but not a convoy. More calculations of effects had also been made: parked aircraft would now be blown overboard from a carrier at sixteen miles from a twenty-megaton explosion.\textsuperscript{85} It was also now clear that the important distinction between air burst and underwater explosions – the contamination carried by the base surge after the latter – had been eliminated. Even an air burst hydrogen bomb would cause serious fallout.\textsuperscript{86} The Working Party eventually produced a fuller Top Secret Atomic report, which remains classified but certainly included sections on threats, effects, medical aspects, ABCD for machinery spaces and finally tactical implications. Its distribution was extensive: the Board,
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thirty-two copies around the Naval Staff and seventeen outside with flag officers and Cs-in-C. The conclusions can only have been sombre, and the civil defence implications for the UK itself, described in the 1955 Strath Report, were even worse. William Strath was a Ministry of Supply official seconded to the Cabinet Office who led a four-month investigation over the winter of 1954-55 into the ‘Defence Implications of Fall-out from a Hydrogen Bomb.’ His report too is still classified, but appears to have painted a grim picture. Fallout from hydrogen bombs presented “problems of a revolutionary character for the defence of this country,” and if ten were dropped on London and other British cities, twelve million deaths and four million serious casualties could be expected. Half of Britain’s industrial capacity would be destroyed and forty million survivors would be living under siege conditions, leading to an entirely unpredictable “chain reaction” in society and the economy. Nevertheless the conclusion appears to have been drawn that although, as the Chiefs had already suggested, Britain could no longer function as a ‘main support area’ in war, and although “a determined hydrogen bomb attack against this country would cause human and material destruction on an appalling scale, it would be possible to contain its effects and enable the nation to survive if adequate preparations had been made in advance.”

The Admiralty was also able to claim that the report was “broadly in conformity with our own study.” A small team under H W Pout, later MoD Assistant Chief Scientific Adviser, had begun work in DOR in around April 1954 on the possible overall course of a global nuclear war ten or twenty years in the future. Pout had been tasked with a study of defence against a Soviet mining offensive in global war, but soon began to question the assumption behind the work: why would the USSR be mining the approaches to British ports which had already been destroyed by atomic attack, and why would mine clearance be required? Using an operational research methodology, he attempted to determine the resources the protagonists would have available and to bracket the likely strategies and outcomes these would be capable of producing. War games were played out to simulate nuclear exchanges and, importantly, the work began to show that the broken-backed warfare assumption remained valid – that there were courses of action, within the economic capabilities of the great powers, which would permit survival beyond the initial exchange. By the end of 1955 these studies had come to the attention of the First Sea Lord, and were later reorganised on inter-service lines under a Joint Global War Committee reporting to the Chiefs. Asked to comment on the Strath Report, Pout suggested that the threat had been assumed rather than

87 The paper should be TSD303/54, ‘Naval Aspects of the Hydrogen Bomb’ of 7 May 1956 in PRO, ADM 1/26710. The file does include correspondence on its distribution and security measures, and I am grateful to Iain Goode at the MoD for arranging its release.


calculated, and therefore somewhat overstated. Nevertheless there was little room for complacency, and another Admiralty study the following year showed that the effects of a ten-megaton attack on a fleet at anchor in Scapa Flow would be truly apocalyptic, in stark contrast to the conclusions of Roskill’s 1946 Bikini report. The author of the new paper concluded bluntly that “the fleet would be destroyed” and that his figures rendered a calculation of specific heat, blast and radiation effects “almost superfluous.”

The Review of Naval Policy

The most significant of the internal Admiralty reviews occasioned by the hydrogen bomb was begun at the most senior level by First Sea Lord Rhoderick McGrigor in July 1954, directly after the Cabinet’s ‘decision’ to proceed with the bomb. The review, initially leading to the production of a D of P paper on ‘The Navy and the Hydrogen Bomb War’ and later spawning a formal Board of Admiralty ‘Steering Committee on the Review of Naval Policy,’ is sometimes confused with Mountbatten’s ‘Way Ahead’ committee. In fact, although the two proceeded side by side for some time until emphasis gradually shifted to the latter, McGrigor’s review was a quite separate process. In it, he made a serious attempt to reconcile the broken-backed war idea with new thermonuclear realities. His successor intended the ‘Way Ahead’ process instead to attack the Navy’s ‘teeth to tail ratio’ by eliminating wasteful administration in shore establishments. Nevertheless Mountbatten was influenced by the Review of Naval Policy, refusing for example to accept during the defence reviews of 1955-56 that broken-backed warfare was dead. This refusal has too often been dismissed as naval recalcitrance in the face of a new strategic situation, or as a ploy to buy time while the Navy reinvented itself with an offensive tactical nuclear and deterrent role. Such a conclusion is easy to reach by reading the documents at the commanding heights of the debate, but less easy to sustain after careful study of the serious efforts being made at working level.

McGrigor wrote to Board members on 28 July 1954, just two days after the Cabinet’s final meeting to ratify the H-bomb ‘decision.’ Somewhat unusually, an early draft survives with manuscript additions by the First Sea Lord himself. McGrigor saw three possible uses for the H-bomb: in a ‘battle of the airfields,’ equivalent perhaps to naval attack at source and aiming to reduce the nuclear threat


91 PRO, Admiralty Research Laboratory report ‘Effect of a 10Mt Weapon on a Fleet at Anchor in Scapa Flow,’ ADM 204/2267. It should be noted that no postwar fleet would actually have anchored at Scapa in the close formation suggested by this paper.


93 See e.g., Clark and Wheeler, The British Origins of Nuclear Strategy, pp.206-7; Navias, Nuclear Weapons and British Strategic Planning, pp.73-84; Baylis, Ambiguity and Deterrence, pp.209-17.

94 PRO, undated note 1655 to 2SL, Ctrlr, 4SL, 5SL, VCNS, DCNS in part 8C of ADM 205/102.
against the UK; in a Soviet attempt to deliver a knock-out blow to paralyse NATO countries including the UK; and in attacks on the two sides' armed forces, including ports, naval bases, ships and convoys. Dispersion would be necessary to fight such a war: ships would have to sail, and naval aircraft scramble, at the outbreak. Small and frequent convoys would be run; replenishment, reserves and stores would be vital; a more mobile seaward defence would be required; and emergency ports might have to begin functioning even prewar, during a ‘warning period.’ VCNS endorsed McGrigor’s views and reintroduced the old idea of dispersal of population and industry away from the UK, as well as pointing out the advantages of carriers over fixed airfields in dodging nuclear attack. The Sea Lords and Cs-in-C met and discussed these questions in September, and McGrigor circulated a new paper to them entitled ‘The Navy and the Hydrogen Bomb War.’

This paper took a worst-case assumption – unlimited nuclear war without warning – although it also raised questions about this assumption. Would a state of mutual deterrence, for example, exist in the not too distant future? For now, the paper envisaged Soviet nuclear attacks in war against Britain’s nuclear capability (including bomber bases, atomic factories and carrier bases), ports, headquarters, centres of government and administration, and industries. The effects on the UK might be catastrophic, but “there would be no formal surrender” and so a broken-backed phase, recognisable in the text but not named as such, would follow. The Navy would have to take the offensive to keep the sea lanes open; to defend merchantmen from air attack, if necessary in port as well as at sea; and to ferry in warlike stores as required. Wide dispersion, including of forces at sea, was recommended, and the viability of carrier task forces – tempting atomic targets – was questioned. A number of policy implications was highlighted. Offensive use of nuclear weapons was recommended: “at present the Royal Navy is severely limited in offensive power since HM Ships lack an atomic capability.” This significant strand in naval thinking will be covered in the next chapter.

On the outbreak of war, the paper continued, ships would have to be turned away from particularly vulnerable ports or readied for sea rapidly. Other planning measures would be taken long in advance: cheap and cheerful ships could be designed to provide unattractive nuclear targets; reserve units could be placed abroad if unable to raise steam within forty-eight hours; dispersed basing, stockpiling, maintenance and repair would be vital, as would a “substantial and comprehensive Fleet Train.” Control of shipping would require attention: imports might have to cease altogether for a time, and PEP arrangements would then come into effect. Other recommendations covered mine warfare, headquarters organisation, mobilisation plans and once again “the emigration of large numbers of inhabitants from the United Kingdom.” A series of studies into the various subjects touched upon would be necessary.

McGrigor was clearly enthusiastic about the paper in broad terms, although he was uneasy about the suggestion that carriers offered too tempting a target for atomic attack. He was also more inclined to be bullish about the

95 PRO, VCNS to 1SL of 27 Jul 1954, and 1SL's 2006 of 30 Sep 1954 in *ibid.*
96 At the time too it was decided to regard the two subjects as separate: see PRO, SMBA.4346 of 1 Mar 1955 in ADM 1/26067.
97 PRO, D of P paper PD Ref R51/1232/1 of 1 Oct 1954 in part 8C of ADM 205/102.
prospects for attack at source and other measures to reduce the weight of Soviet attack. Hence by the time the paper — now retitled ‘Review of Naval Policy’ — reached the Board of Admiralty in December, it had been somewhat recast.

A Steering Committee was appointed to oversee the review, and met for the first time on 14 December 1954 to revise the list of studies, combining some and removing one, on defensive armament for merchant ships. By August 1955 twelve studies, each supported by a working party drawn from the Naval Staff, were in progress. These covered alert measures, the Reserve Fleet, logistic support, naval aviation, control of shipping, ships converted from trade, defence of ports, shore establishments, headquarters, mine countermeasures, mobilisation and movements, and weapons effects. Efforts were made to ‘sell’ the Review of Naval Policy to an audience beyond the Admiralty as a sensible and unique attempt to come to terms with the thermonuclear era. D of P rather proudly wrote to the First Sea Lord that “it is clear from my discussions with my colleagues that the other two services have not undertaken any studies resembling our ‘Review of Naval Policy’ and ‘Quo Vadimus’.” Head of M Branch was forced however to admit ahead of a ministerial meeting the same month that this argument had not impressed those involved in the latest Long Term Defence Review.

The end of broken-backed warfare

Even as the Review of Naval Policy got underway, government efforts to cut back on defence were gaining strength once again. The Board of Admiralty had repeatedly to emphasise its strong objections to eliminating capabilities for global war beyond the initial atomic phase:

The risks involved in adopting this policy prejudice the ability of the United Kingdom to survive after the initial bombardment in a global war, should that occur . . . The survival and revival of life in this country after a thermo-nuclear attack will depend on the Navy’s ability to ensure the delivery of supplies.

The virtual elimination of a global war role would mean that the ability to sustain the country after thermo-nuclear bombardment would be surrendered, or at least made entirely dependent on the willingness of the US Navy to ensure the import of the necessary supplies.

Other arguments were also brought forward: the ability to continue to fight after an initial thermonuclear bombardment might be considered a necessary part of the deterrent, and in conditions of mutual nuclear deterrence it was possible that a conventional anti-submarine campaign would have to be fought before, rather than

98 PRO, 1SL’s 2006 of 30 Sep 1954 in ibid.
99 PRO, Board memo B942 of 26 Nov 1954 in ADM 167/144 seems to be a sixth draft.
100 PRO, D of P to 1SL of 15 Jul 1955 in ADM 205/164; H of M note of 9 Jul 1955 in ibid. (‘Quo Vadimus’ is an early name for Mountbatten’s ‘Way Ahead’ initiative).
101 PRO, Board memo B1004 of 25 Jul 1955 in ADM 167/141.
102 PRO, Board minute 5016 of 7 Jun 1956 in ADM 167/146.
after a nuclear exchange. This latter idea was taken up more energetically in the later 1950s and will be discussed at some length in chapter four. As time went by, the Board’s complaints at attacks on its global war capabilities became more shrill. In December 1956, the Board discussed the short war assumption and the renewed suggestion that forces for broken-backed warfare should be eliminated:

This assumption was not adopted in NATO planning nor in that of the United States. Nor did Soviet Russia appear to believe in it, or she would not be devoting so much energy to the creation of a vast submarine fleet. Conversely, the Board could not accept the responsibility for ensuring the safe arrival of essential imports in global war without the resources . . . the Government must formally absolve it from that responsibility.

This refrain was still faintly audible in 1957: “If the Government are prepared to accept the risk of not preparing to defend our NATO sea communications, they must say so clearly, and lift the responsibility from the Board of Admiralty.”

It had become clear however that new money could not be made available to implement the recommendations of the various working parties set up under the Review of Naval Policy. The priorities listed in the Chiefs’ original ‘thermonuclear appreciation’ became important: the Cold War and deterrence first, with preparations to fight a global war some way behind. By December 1954, the Board had already directed that no papers on the Review of Naval Policy should be circulated outside the Admiralty, “since it would be bound to imply a readiness to undertake large additional financial burdens, which was unlikely to be true.” In August 1955, the working party considering logistic support, which had been concentrating its attention upon dispersal and emergency bases, was told that it should limit its deliberations to the first ninety days of war: “ninety days’ supply was the very most that we could afford and the most that was to be authorised.” The logic in this conclusion was purely economic.

A circular from the Head of M Branch in December made the point once again: “Their Lordships have concluded that although . . . the studies now in train will be of great value and should continue . . . it will be impracticable in present circumstances to put into effect many of the recommendations that will stem from these studies.” During 1956 and 1957, significant reductions in the global war navy were approved, especially in coastal forces and minesweepers. The Reserve Fleet was also reduced. Whilst the relevant working party of the Review of Naval Policy had begun by devising distinctions between reserve ships in an effort to get as many to sea as possible in as short a time as possible – about forty in the first fourteen days of war – by 1958 the Reserve Fleet was regarded as a source of substitute ships in case of accidents and refits to

103 PRO, Board minutes 5021 of 21 Jun 1956 and 5030 of 19 Jul 1956 in ibid.
104 PRO, Board minute 5078 of 20 Dec 1956 in ibid.
105 PRO, Board memo B1163 of 30 Aug 1957 in ADM 167/150.
106 PRO, Board minute 4826 of 9 Dec 1954 in ADM 167/144.
107 PRO, note of 17 August 1955 in ADM 1/26330.
the active fleet, rather than as a pool of forces to be mobilised in war. Only minesweepers remained in significant numbers.\(^{109}\) Although large numbers of wartime anti-submarine escorts now went to the breakers, however, it should be noted that the Type 14 (\textit{Blackwood}-class) frigates and the Type 15 and 16 conversions continued to commission up to 1957, and remained in service for many more years, as did numerous minesweepers. Between 1956 and 1958, an Admiralty Atlantic War Working Party conducted a long study of anti-submarine requirements for a scenario in 1967 in which "the main nuclear offensive on both sides has been halted by losses and there is, as yet, no evidence of capitulation on either side."\(^{110}\) The Navy had not yet given up its broken-backed warfare capability, or even its research into the idea; the protection of sea communications remained important. Rather, it had become clear that to describe and justify naval forces in global war terms was no longer politically correct.

Broken-backed warfare had been an article of faith for many years. A refrain often heard was that to plan for a short war would be irresponsible, an abdication of duty towards the forty million survivors mentioned in the Strath Report, a "policy of despair."\(^{111}\) Broken-backed warfare was current as a basis for planning well before 1952 and, in NATO circles, well after 1957. It perhaps owed its prominence in the central period between these dates to the rise of other, competing ideas: the short war obsession of Slessor was the new factor in 1952, driving McGrigor to label existing plans as ‘broken-backed warfare’ and to press successfully for their inclusion in the Global Strategy Paper. The hydrogen bomb was new in 1954 and would have made broken-backed warfare much more problematic, but the Navy was prepared at least initially to face up to this and, in the Review of Naval Policy, it set out with positive ideas to reconcile broken-backed warfare and thermonuclear weapons. Then the economy-led revisionism of Macmillan and Sandys knocked global warfighting on the head as practical politics, and the modernism of Mountbatten led to enthusiasm for new ships, guided weapons, nuclear submarines and the East of Suez role. It was however with disappointment, rather than enthusiasm, that a Board paper described the end of broken-backed warfare in 1957:

> Naval planning for Global War has not so far resolved the problems involved in conducting maritime operations from this country after the megaton attack. The reason for this failure is that the comprehensive investigation of the problem set up as the Review of Naval Policy was not able to complete its task before the cold blasts of defence economy made its proposals demonstrably impossible of achievement.

\(^{109}\) PRO, Board minutes 5013 of 7 Jun 1956, 5060 of 25 Oct 1956 both in ADM 167/146; Board memo B1139 of 9 Apr 1957 in ADM 167/150 and minute 5133 of 20 Jun 1957 in ADM 167/149; Board memo B1192 of 18 Feb 1959 in ADM 167/152; see also COS(56)280(Revise) of 25 Jul 1956 ‘The Future Role of the Navy’ in DEFE 5/70.

\(^{110}\) PRO, Mountbatten to Burke of 22 Jan 1957 in ADM 205/204 covers the conclusions of the study; see also Pratt, ‘A Rose By Any Other Name, Pt.2’ in \textit{Journal of Naval Science} Apr 1981, p.107.

\(^{111}\) Cunningham in the House of Lords, 16 Mar 1954, quoted in \textit{The Naval Review} May 1954, p.159; PRO, Plans Division paper on seaward defence of 1 Nov 1954 in ADM 1/28924; D of P Ref R51/1232/1 of 1 Oct 1954 in part 8C of ADM 205/102.
Chapter 2: Broken-backed Warfare

The Review of Naval Policy studies were not carried out with any extravagant assumptions that unlimited money would be available, nor did they contemplate in any instance a 'Rolls Royce' solution where a simpler though less satisfactory alternative was available. Generally they proposed the minimum shore and logistic support to enable the Royal Navy to take its traditional place as the maritime arm of a major power which was proposing to survive and fight in both the first and second phases of thermo-nuclear war... The progress of these studies was overtaken by the reappraisal of the National Defence Policy which culminated in the 1957 Defence White Paper.\(\text{112}\)

As time went by, the broken-backed warfare idea ceased to be central to the Navy's thinking. NATO doctrine continued to envisage an initial exchange followed by a broken-backed phase, but a new emphasis on offensive operations, and on flexibility for cold and limited war, was built energetically upon McGrigor's foundations. This came to sustain the Navy into the 1960s. Indeed, McGrigor himself, writing with some satisfaction to Admiral Sir Martin Dunbar-Nasmith, chose to emphasise as his legacy the offensive future of the Navy and in particular its carriers:

What has happened is that in the past two years there has been a bitter struggle going on as to the future of the three services, and their role and task in these hydrogen days. At one time it was even suggested that the Navy was not needed, except for a few smaller vessels... We have won through all that phase, and the Defence White Paper shows very clearly how the Navy is needed in peace and war, and how it centres around the Aircraft Carrier.\(\text{113}\)

Crowe believes that broken-backed warfare had become something of a burden by 1957, and Darby that its collapse "prodde the Navy into formulating a viable role."\(\text{114}\) Some officers had never been very enthusiastic: Admiral Sir Ralph Edwards disliked the "cheap and nasty frigates" of the global war navy, and one writer complained that "arguments about surviving in the 'broken-backed stage' arouse little enthusiasm."\(\text{115}\) Whilst recognising the importance of broken-backed warfare, we must now seek to understand such objections, and to ask whether they betokened a quite different naval attitude to nuclear weapons in the mid-1950s.

\(\text{112}\) PRO, Board memo B1147 of 3 Jun 1957 in ADM 167/150. The final statement is broadly correct, although in fact the 1957 White Paper itself mentioned broken-backed warfare (see above, note 4), and Sandys showed some interest in naval anti-submarine warfare capabilities.

\(\text{113}\) PRO, McGrigor to Dunbar-Nasmith of 2 Mar 1955 in section 8A of ADM 205/106.

\(\text{114}\) Crowe, 'Policy Roots,' p.195; Darby, \textit{British Defence Policy East of Suez}, p.111.

\(\text{115}\) PRO, Controller to ISL of 6 May 1954 in section 8C of ADM 205/102; Blob, 'Thoughts on Morale' in \textit{The Naval Review} Apr 1957, pp.189-96
Liverpool was the assumed target for a number of 1950s studies of the effects of atomic attack. The conclusions were not cheerful, but neither were they apocalyptic. "In the event of one accurate air-burst on the Liverpool Docks, more than half of the dock area (actually about 7000 yards of frontage out of a total of 11,000 yards) would be working within a few days" (pp.67-8, PRO, HO 357/10, ADM 1/26944).
Chapter 2: Broken-backed Warfare

Fig. 8: Atomic attack on North-west England

If Liverpool had been put out of action, emergency ports would have been set up in the North-west and North Wales to substitute for some of its importing capacity. The ports investigated were close to inland rail links (pp. 70-2; PRO, HO 357/3).
Fig.9: Operation Hurricane

In these high-speed photographs, taken in the millisecond after the explosion of Britain's first atomic bomb, the bow of HMS Plym can be seen silhouetted in front of the fireball (the ship lies diagonally on to us, with her bow to the front and the right; the explosion is below the waterline behind her forward collision bulkhead). The trial was designed to simulate an attack on a British port (pp.66-8, PRO, AIR 8/2309).
Fig. 10: ABCD

The trials cruiser HMS *Cumberland* conducts decontamination trials in 1955. Pre-wetting of exposed surfaces increases the effectiveness of subsequent efforts to wash away radioactive fallout (p. 76, *Navy* May 1955).
Fig.11: Atomic attack on Scapa Flow

Compare this diagram, from Roskill's report of Operation Crossroads, with fig. 12. Two underwater burst atomic bombs are required to sink six warships, disable four more and cause heavy casualties on a further six (p.47, PRO, ADM 239/378)
Fig. 12: H-bomb attack on Scapa Flow

Compare this diagram, from a May 1956 Admiralty Research Laboratory report, with fig. 11. The scale is the same, and the two concentric circles are approximately equivalent in damage terms to the innermost circles in fig. 11. The author of the new paper concluded bluntly that “the fleet would be destroyed.” In fact, no postwar fleet would have presented such a target, but the contrast in practical destructive power between the atomic and H-bombs is stark (p 81; PRO, ADM 204/2267).
Chapter 3: Nuclear Ambitions

When it came to fighting, Woundwort was not given to careful calculation. Men, and larger animals such as wolves, usually have an idea of their own numbers and those of the enemy and this affects their readiness to fight and how they go about it . . . This sort of thing does not count among fighting rabbits. Ferocity and aggression are everything.

(Richard Adams, Watership Down)

I have described in my introduction the long tradition of celebrating the offensive spirit of the Royal Navy personified by Drake, Nelson and its other famous heroes. I have also argued that the same offensive spirit was hailed as the cardinal factor in such wartime successes as the big ship navy managed to achieve at Matapan, Taranto and against the Bismarck and Scharnhorst. Notwithstanding the rather greater caution of its deeper thinkers such as Corbett and Richmond, the Navy had nurtured this tradition well in the minds of its officers and men and, as I noted in chapter one, the atomic bomb had an immediate appeal in 1945 in this context. Thoughts of atomic bombers operating from aircraft carriers were proved unrealistic in 1948-49, and I have taken some care in chapter two to emphasise the considerable thought and effort devoted to the defensive implications of nuclear weapons in the early to mid-1950s. This is not to say however that the offensive possibilities of nuclear weapons were neglected. Although I believe most commentators have overstated the Navy’s interest in a deterrent role, especially during the period 1953-54 when expensive carrier modernisation plans had to be justified, there is no denying the presence of this strand of thought. In this chapter I shall briefly examine ‘attack at source’ and other offensive naval plans, and the factors which made them attractive during the period of broken-backed warfare’s prominence in naval plans, before looking in detail at the Royal Navy’s part in early British nuclear weapons developments. I shall argue that support for an offensive nuclear strategy took second place throughout to purely tactical considerations in provoking interest in naval nuclear weapons.

Attack at source and NATO naval strategy

It is important to remember that NATO did not “spring into being like Athene, fully armed and looking for trouble” on its formation in 1949.¹ This was especially true at sea. NATO was, politically speaking, intended more as a visible commitment to the land defence of the European continent than to the surrounding waters, and although the one certainly implied the other it was NATO’s organisation on the ground which received more attention once the Korean War provided the necessary

¹ Humble, Fraser of North Cape, p.319.
stimulus to concrete planning. At the end of 1950, Eisenhower was appointed to the new post of Supreme Allied Commander Europe (SACEUR). US land forces began to arrive in Europe in significant numbers in 1951. At sea, the allies occupied themselves instead with years of rather tedious squabbling, most pronounced at the political level, over command arrangements. There was a great deal of pride to be swallowed by the British, since the US Navy was now comfortably superior in numbers in all theatres and it made sense for Americans to be given the top jobs. Winston Churchill was one of many who found this difficult to accept, and his return to power in Britain prolonged the agony still further. Only in 1952 was sufficient agreement reached to permit the appointment of a Supreme Allied Commander Atlantic (SACA, later and better known as SACLANT).

Already however there had been NATO discussions of naval strategy. A North Atlantic Ocean Regional Planning Group, dominated by the US and Royal Navies, was established as early as October 1949. Various strands of thought led the new alliance to express its strategy in offensive terms. The task of unravelling these is unfortunately not helped by the need felt by recent American historians to discuss these developments largely in terms of the US Navy’s ‘Maritime Strategy’ of the 1980s. Wartime experiences with carrier aviation, disputes over strategic bombing and the political necessity to justify naval forces in terms of exciting offensive, and if possible nuclear, capabilities, were important to the US Navy in this period. The fast submerged speeds of the German Type XXI and Type XXIII U-boats encountered at the end of the war made existing anti-submarine tactics and some weapons obsolescent, and evidence that the USSR was building equivalents renewed wartime debates on the best balance between direct convoy, transit offensives and hunter-killer patrols. Palmer recognises these and other factors in the forward strategy advocated by Admiral Forrest Sherman as Deputy CNO for Operations, and later CNO (1949-51):

The foundations of [postwar] strategy were the geopolitical necessities of any war with the Soviet Union, a perceived gap between antisubmarine warfare capabilities and new submarine designs, a belief in the ability of carriers to operate within range of enemy land-based aircraft, and an awareness that European waters, especially those of the Mediterranean and the Middle East, had replaced the Pacific as the main theatre of operations.

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3 See Grove, *Vanguard to Trident*, pp.54-5, 103-6; Sokolsky, *Seapower in the Nuclear Age*.


The ‘air-atomic’ offensive strategy was balanced and reinforced therefore by a ‘sea control’ offensive strategy. We should perhaps beware of overemphasising the anti-submarine strand in US thinking at this stage. The Americans were worried by the submarine threat, but the fact that their response was to stress offensive carrier operations can be explained at least partly by their successful experience during the Second World War in the Pacific – hardly an anti-submarine campaign. When it came to actual operations, British observers occasionally criticised the Americans’ carelessness of the submarine threat. Within the Striking Fleet, the Americans saw their carriers’ role as nuclear attack, whilst the British saw their own unique contribution as anti-submarine and anti-aircraft defence. The Royal Navy at the time probably liked to think that it had the more sensible regard for anti-submarine warfare.

The question of attack at source to reduce the submarine threat to sea communications had been the subject of bitter debate in Britain during the war, and this debate resumed as early as 1949. We have seen that the scenario for Exercise Trident was built around a struggle for sea control in the high Arctic, and that this was somewhat controversial. At the same time, an Admiralty-Air Ministry Joint Sea Air Warfare Committee and an Admiralty Source Attack Working Party were advocating a study of the problem, in particular, of air attacks against submarine bases and support facilities. Progress was not rapid and only in February 1951 did the study team report. They had assumed a prolonged conventional bombing campaign with Royal Navy, US Navy, RAF and USAF contributions, and had drawn up detailed lists and maps of targets throughout eastern Europe which would contribute directly or indirectly to a Soviet submarine offensive. Efforts on this part of the war effort would not be all-out: Royal Navy carriers for example “might be employed against short range targets from time to time [but only] as the progress of the war at sea permitted.” Only fitful correspondence on the subject survives, although Palmer stresses the importance to American planners of the Sea Air Warfare Committee’s 1951 conclusion that “the war cannot be won by defensive action alone and therefore attacks against enemy submarine and air bases will be a major factor in achieving our aim of maintaining sea communications.”

Higher-level attention was focussed on the subject when in 1952 the Chiefs were warned that no proper US plan for attack on Soviet mining and submarine bases existed, and the JPS was tasked with a study of attack at source to reduce the threat to sea communications in a war beginning in 1954. This time, atomic as

8 See e.g., PRO, ADM 1/23452, Report on Experiences in Exercise Mainbrace: “the US Navy knows only one way of operating a Carrier Task Force, the Pacific way . . . the submarine threat was almost completely ignored.”
9 PRO, Head of Air Branch note of 20 Oct 1952 covering SAWC1/51/4 of 21 Feb 1951 in ADM 1/23061. Some of the Sea Air Warfare Committee’s papers are preserved in AIR 20/10175-7.
10 Quoted in Palmer, Origins of the Maritime Strategy., p.84.
11 PRO, JP(52)112(T of R) of 9 Sep 1952 in DEFE 6/22.
well as conventional attacks on Soviet factories and airfields, submarine bases, yards, surface vessels and their bases, mineable waters, communications and oil production and storage facilities were considered. Progress was again slow and a report was not produced until September 1953. Atomic attacks on a large complex of targets were recommended, with priority going to those in the Baltic. It is worth once again putting aside the 1986 Maritime Strategy and remembering that in the immediate postwar period naval facilities around Murmansk were extremely primitive. The Baltic Fleet was still the USSR’s largest and most powerful, notably in submarines and cruisers. When the Chiefs discussed the report, the Chief of the Air Staff not surprisingly led the attack, stressing attack at source to reduce the threat of air attack on the UK as a priority for the V-bomber force, and not even deigning to mention the possibility of carrier air strikes. Since the report in any case considered a date ahead of the planned introduction of the V-bombers, and since Britain could not otherwise contribute a great deal to any attack at source campaign, it was decided not to forward the report to the US. A revised version with a target date of 1956 was never considered by the Chiefs.

This rehearsal of wartime controversies, rather than the US debate over the carrier and the B-36, was the background we must bear in mind when considering Britain’s part in the NATO Striking Fleet in the early 1950s. The formation of a fast carrier force for the North Atlantic, built around US and British capital ships, was one of the first strategic concerns of SACLANT on his appointment in 1952. His first Emergency Defence Plan defined the role of this Striking Fleet as:

(a) Countering the threat from raiders in the open sea;  
(b) Attack at source to reduce the threat from surface vessels, submarines, aircraft and mines;  
(c) Provision of support to SACEUR including countering any surface threat to this northern flank.

The Striking Fleet, and especially its atomic capability, was a matter of serious controversy at Joint Chiefs level in the US, with the USAF claiming that atomic attack could not reduce the threat to sea communications at all quickly, given the likely dispersal of Soviet forces at sea on D-Day. The Fleet’s formation, as a separate command directly under SACLANT and outside the control of the British CINCEASTLANT, was however eventually approved. Four American strike carriers were earmarked for the Fleet in time of war, and the Royal Navy after some deliberation decided to commit both of its own modern fleet carriers. As such, the


12 PRO, JP(53)18(Final) of 24 Sep 1953 in DEFE 4/65.


15 See correspondence in PRO, ADM 1/24065, including letters from an unhappy Mountbatten, who as C-in-C Mediterranean would lose a fleet carrier in war as a result. The change in planned deployment was enshrined in Fairfax, the plan drawn up for a war in the first six months of 1953 (COS(52)701 of 23 Dec 1952 in DEFE 5/43).
Striking Fleet made a fairly unsuccessful debut in two major exercises, Mainbrace in September 1952 and Mariner in September-October 1953. The somewhat disparaging remarks of two British officers at Mainbrace have already been mentioned; at least on this occasion shore bombardment and anti-raider operations were accomplished, even if coordination with other forces in the area and anti-submarine precautions were poor. Mariner, by contrast, despite being played further south, was made almost impossible by weather. Some satisfaction was gained from the seakeeping of HMS Vanguard, but at least some of the planned carrier strikes were impossible and, to add insult to injury, Bomber Command was able to carry out a number of day and night attacks against the fleet, including one when a US combat air patrol was airborne. "Was it worth it?" asked one observer: "There is no doubt that the general opinion from sea was 'no'."17

The Striking Fleet's role was redefined slightly in the 1954 revision of SACLANT's emergency plan, giving attack at source a more central role at the expense of anti-raider operations:

The carrier force will strike directly at the enemy, carrying out attacks against the source of the enemy threat to the Atlantic sea and air communications, including attacks on ports, ships in harbour, naval and air bases and supporting installations, with primary emphasis on the U-boat and its supporting facilities.18

Protection of SACEUR's northern flank, retardation of Soviet advances on the continent and - still controversial in the US - augmentation of the overall strategic air offensive were also mentioned. Britain continued to commit two carriers, although it should be remembered that the Royal Navy's carrier strike capability in these years, based on penny numbers of prop-driven Blackburn Firebrand and Westland Wyvern aircraft, was poor. The Royal Navy still considered its role in the Striking Fleet, tactically speaking, to be integral fighter and anti-submarine protection.19 Strategically speaking, too, there is a distinctive tone to British views of the Striking Fleet, one which looks backward to the wartime Home Fleet rather than forward to an age of atomic air attack:

The Covering Force, known to the Americans as the 'Strike Fleet,' consists of Heavy Carriers, Cruisers, and A/S and A/A escorts, the whole forming a balanced force. This Covering Force is analogous to the Grand Fleet of World War One and the Home Fleet of World War Two. It is, in fact, the umbrella under which we exercise command of sea communications.20

The term 'Striking Fleet' is an Americanism and a misnomer; this fleet will act as a covering force, analogous to the Home Fleet of World War II.21

17 Porthole, 'Exercise Mariner' in The Naval Review Nov 1953, pp.65-73; see also Grove, Vanguard to Trident, pp.167-70. (Porthole's assertion that carrier strikes were prevented by the weather is contradicted by Sokolsky in Seapower in the Nuclear Age: The US Navy and NATO 1949-80, p.28).
18 PRO, EDP1-54 Annex C quoted in brief of Jan 1954 in ADM 205/94.
19 e.g., PRO, brief at enc.102-3 under cover of H of M note of 18 Jan 1954 in ADM 205/94.
20 PRO, VCNS to Powell of 19 Aug 1954 in ADM 205/97.
21 PRO, 1L (Alexander) to PM (Churchill) of 25 Aug 1954 in ibid.
Chapter 3: Nuclear Ambitions

Our conception of a Striking Fleet is a relic of the Battle Fleet idea... SACLANT on the other hand thinks of the Striking Fleet in Pacific terms—a major feature in a land campaign, a task force to support SACEUR, on the Mainbrace model (whether this conception as applied to the North Sea in autumn or winter as opposed to the wide Pacific will be modified by their experience in Mainbrace, remains to be seen). 22

This kind of thinking, harking back to the flexible and pragmatic approach adopted by the Home Fleet between 1939 and 1945 rather than subscribing to a single programmatic role for the Striking Fleet, led some US observers—quite rightly—to question the Royal Navy’s commitment to the NATO concept. 23

The requirement for a naval nuclear weapon

Although the Navy was closely involved in testing Britain’s first atomic bomb, providing a target vessel and a task force commander, it was always understood that the earliest Mk.1 Blue Danube bombs would be delivered to the RAF. As Gowing and others confirm, there was also very little thought given to future developments in atomic weapons whilst all energies were devoted to the production of the first bomb. 24 In the spring of 1951 however a small subcommittee of the DRPC under Sir John Cockcroft did produce a report on possible new weapons: a wide range of designs and yields could, it was thought, be achieved within three years, although given existing resources probably only two separate designs could be developed at any one time. A hydrogen bomb might be possible, as might smaller bombs for other than “blasting and burning cities.” 25 The Chiefs’ appetites were whetted, and they established an OAW Committee of their own on the operational use of atomic weapons. A working party began to meet in October. Submissions were requested from the service ministries and quickly sent; these show that a fair amount of thought had already been given to the subject. By September 1951 there was also clearly some knowledge of American work on tactical nuclear weapons. 26

The Admiralty’s submission, dated 7 November 1951, foreshadowed a great deal of later discussion. The general question of whether the Royal Navy should be equipped with nuclear weapons at all, like the original question of whether Britain

22 PRO, COS(52)588 of 28 Oct 1952, note by CAS ‘Striking Fleet Commander Atlantic’ in DEFE 5/42. See also Torlesse, ‘The Role of the Aircraft Carrier’ in Brasseys Annual 1955 pp.72-82; First Lord’s note of 9 Nov 1953 in ADM 1/24695.


25 The report was DRP/8/51, drafted by Cockcroft’s Subcommittee on the Strategic Aspects of Atomic Energy; this account is based on Gowing, Independence and Deterrence, Vol. I pp.437-9 and early papers in PRO, DEFE 7/1889.

26 US requirements for small atomic bombs and depth charges had already been issued, and although it is unclear to what extent this fact encouraged British decisions to follow suit, some knowledge was certainly available: see e.g., PRO, Elliott (BJSM) to Tizard of 13 Sep 1951 in DEFE 7/1889.
should develop the atomic bomb, appears not to have been asked.\textsuperscript{27} The greatest amount of attention was given to a naval air weapon:

Naval aviation may be used to attack targets against which the use of land-based aircraft is not appropriate or possible. The threat of attack from carriers may cause the enemy to spread his defences, and the carriers may be able to surprise him. Strike aircraft from carriers can be strongly escorted by fighters... 

[Targets could include:] 
(a) city-like targets within range of a carrier in which mass destruction is required; 
(b) harbour and dockyard targets, in which accurately placed airburst is needed to destroy ships and dockyard facilities; 
(c) strong Naval targets such as U-boat pens, dry-docks, heavy ships... which would need a close airburst, or better, an underwater or penetrating ground burst as appropriate.\textsuperscript{28}

The prominent mention of cities is interesting; Canberras were suggested as possible delivery aircraft. The paper listed a delayed-action bomb for low-level delivery, an impact or penetrating weapon, and a rocket propelled proximity fused stand-off weapon as the Navy's main priorities. Next in order of desirability came a 'sneak' weapon for an X-craft or disguised merchantman, a 'super depth charge' and finally an anti-ship homing weapon for use from an aircraft. The depth charge would require more study, since target detection would be problematic at the kind of range necessary to ensure the safety of the ship delivering the weapon. Inshore use would be quite impossible, and the weapon would have to be extremely plentiful since it would need to be distributed widely among HM Ships, even if expenditure rates were low. This would be even more true of two other possible weapons, for ship-to-ship and ship-to-air use, both of which were discounted. Finally and for the longer term the Admiralty also mentioned "the concept of using a nuclear-powered submarine to launch rocket-type weapons with atomic warheads... from 50 to 100 miles offshore."\textsuperscript{29}

By April 1952 a consensus appeared to be emerging between the Navy and the RAF on future requirements: the Navy was interested in a penetrating bomb to attack U-boat pens, and the RAF to build on the wartime 'Tallboy' concept.\textsuperscript{30} An interim report from the OAW Committee made this the UK's first priority for a Mk.2 atomic weapon, followed by a small air burst bomb. Naval sneak craft and Army land mine requirements also remained under consideration, although the depth

\textsuperscript{27} This kind of unthinking assumption was common: see the various published accounts of the atomic bomb 'decision' in e.g., Clark and Wheeler, The British Origins of Nuclear Strategy, pp.43-9; Baylis, Ambiguity and Deterrence, pp.52-5.

\textsuperscript{28} PRO, OAW/P(51)6 of 7 Nov 1951 'Naval Atomic Weapons: Memo by the Admiralty' in DEFE 7/1889.

\textsuperscript{29} \textit{ibid.}; note that William Penney too was dismissive of anti-submarine atomic weapons during 1951 – see PRO, Penney to Brundrett of 18 Jun 1951 in DEFE 7/1889.

\textsuperscript{30} See papers in PRO, AIR 2/13756 ('Tallboy' and 'Grand Slam' were penetrating bombs used during the Second World War to create damage by earth tremors).
charge was set aside.\textsuperscript{31} Later in the year, these conclusions were modified because a penetrating bomb was now thought difficult to achieve: it would need a U-235 gun-type core, and enriched uranium would be unavailable before 1956; even then there would be a risk of a fizzle in such a weapon because of the shock of impact; finally, the Montebello Islands test had demonstrated that a non-penetrating surface burst could be very effective anyway in a harbour, especially in causing contamination. The Chiefs now endorsed instead the requirement for the small air burst bomb, stipulating that this should be capable of use at high and low level and should incorporate in the latter case some means of increasing the time between release and detonation to allow the delivery aircraft to escape the blast. Low-level delivery was at this stage, and for some years to come, solely a Royal Navy requirement and related to a lack of high-level bombing aids rather than to the later fashion for sneaking under enemy radar. It was hoped that the small bomb would be available for use on the RAF’s Javelin aircraft and the Navy’s N113 (Scimitar) from 1955. Finally, the sneak weapon and land mine requirements still stood.\textsuperscript{32} A small inter-service OAW staff, including future First Sea Lord Captain Mike Le Fanu, was assigned to refine this requirement further.\textsuperscript{33}

Interestingly, the Admiralty was able to report at the end of 1952 on US naval tactical nuclear weapons in some detail. A Royal Navy pilot had been integrated for a year into US Navy units, flying Banshee aircraft and developing dive and toss bombing techniques for delivering first generation tactical atomic bombs including the TX-7 and TX-8. The weights and external characteristics of these weapons were described fairly accurately in a paper for the OAW Committee – at a time when the release of such information to the UK was still illegal.\textsuperscript{34}

The OAW Staff reported in July 1953 and recommended a ten-kiloton warhead in a 30-inch diameter bomb for use on the Javelin and N113, the weapon to be available by 1957. The naval sneak craft, it was now thought, could use a virtually unmodified Blue Danube warhead. Other possible naval nuclear weapons were still some way off, although the Air Ministry was beginning to show more interest in a nuclear-tipped surface-to-air weapon and in the same month Rear Admiral Barnard (DCNS) again mentioned a short-range surface-to-surface weapon for use from a submarine.\textsuperscript{35}

\footnotesize
\textsuperscript{31} PRO, OAW/M(52)2 of 21 Apr 1952 and extract of COS(52)56th mtg of 23 Apr 1952, both in DEFE 7/1889.

\textsuperscript{32} PRO, COS(52)610 also OAW/P(52)8 of 8 Nov 1952 in DEFE 5/41; see also DCNS to VCNS of 22 Dec 1952 in ADM 116/6087.

\textsuperscript{33} This is the special top secret project mentioned by Le Fanu’s biographer (Baker, \textit{Dry Ginger}, p.116).

\textsuperscript{34} PRO, OAW/P(52)10 of 24 Dec 1952 from DCNS in AVIA 65/1145 (the data tally fairly closely with those in Chuck Hansen’s \textit{US Nuclear Weapons: The Secret History}, although exchange of information on the external characteristics of weapons was only legalised by revision of the US Atomic Energy Act in 1954).

\textsuperscript{35} PRO, COS(53)511 of 12 Oct 1953 in DEFE 32/3; see also COS(53)359 of 24 Jul 1953 and OAW/M(53)2 of 13 Jul 1953, both in DEFE 7/2340.
New carriers and carrier strike aircraft

At more or less the same time as these first realistic plans were being made for naval tactical nuclear weapons, studies were also underway into aircraft and ships to carry them. It made no sense to have a nuclear weapon without a complete delivery system, as Tizard and others pointed out in contemporary discussions of the V-bombers, although in the naval case at least the two should not simplistically be regarded as part of the same linear development. The precise juxtaposition of horse and cart is often difficult to trace: the aircraft and bomb projects each developed their own momentum, and the carrier, the final element of the delivery system, was another quite different and more difficult matter.

The Admiralty’s Ship Design Policy Committee asked for outline requirements for a new fleet carrier in April 1952. DTSD quickly replied that such a vessel should displace around 55,000 tons, have a draught of thirty-five feet and a flight deck length of 1000 feet, and be constructed with ABCD in mind, including grouped ventilation and a small amount of armour protection for radiation shielding and blast strength. D of P outlined the roles expected of the ship: fighter defence of the fleet was listed first, followed by strikes against sea and land targets up to 1000 miles from the ship, then anti-submarine and other roles. The ship would be designed to carry “perhaps one squadron of eight A-bomb carriers . . . of about the Canberra size.” In this way the ship would “enable us to make best use of the tactical A weapon since targets deep in enemy territory will come within range.”

At first sight, it seems that the Navy was planning to arrogate to itself a strategic nuclear delivery role; in fact, however, although the planned carrier came at the same time as the first requirement for a Mk.2 atomic bomb and the formation of the SACLANT Striking Fleet, the amount of political capital invested in the idea was small. McGrigor may or may not have mentioned the proposal at Greenwich in June – no record has survived of the Chiefs’ deliberations – but it gets no mention in the resultant Global Strategy Paper or in other contemporary high-level documents. The expense of a new carrier, coming at a time when Korean War rearmament was slowing down and the global war navy of escorts and minesweepers was keeping the shipyards and the Treasury busy, was quite unrealistic, and I can find no evidence to suggest that serious thought was given to navalising the Canberra bomber. Controller stopped work on the new carrier in July 1953.

The idea of nuclear strikes from carriers against strategic targets on land, including cities, did not go away but resurfaced from time to time during the following two years’ defence debates. It was periodically pointed out that carriers were harder to locate than V-bomber airfields, that they increased the problems of defence by varying the likely direction of attack, or simply that they constituted a force multiplier. Most commentators have drawn the conclusion, especially from some of the more strongly worded examples, that the Navy was genuinely interested

36 PRO, papers in ADM 1/24145, ADM 1/24508; Friedman, British Carrier Aviation, pp.327-32.

37 Friedman, ibid., pp.332-3 (Friedman’s table 16.3 mentions the possibility of using US A3D Skywarrior aircraft – this was equally unrealistic given the likely dollar cost).
in grabbing a share of the deterrent role from the RAF.\textsuperscript{38} Certainly the Admiralty was faced during 1953-55 with repeated attacks on its carrier plans, including the important modernisations required to allow existing ships to operate modern jet aircraft. A large number of roles – the larger the better – had perforce to be presented and indeed the aircraft carrier, like the Royal Navy as a whole, was quite genuinely viewed as a balanced and flexible instrument capable of a large number of warlike functions. But various Admiralty documents make it clear that a lot of arguments were introduced purely for Machiavellian reasons. Head of M Branch for example suggested in January 1954 that it would be politically useful to announce that atomic weapons would be available to the Fleet without prejudice to the controversial argument about attacking strategic targets. Another brief stated coyly that “the Naval Staff would not feel justified in stating a requirement for an aircraft solely to attack shore objectives... However, the Navy has frequently been called upon to attack such targets and it is apposite to examine the NA39’s potentialities in this field.”\textsuperscript{39} In a later example the Naval Staff pointed out that “a ‘Pearl Harbour’ against allied bomber airfields may well leave the carriers as the only British surviving source of nuclear attack.”\textsuperscript{40} Clark and Wheeler are quite right to take these statements lightly, just as Grove is correct to describe the Naval Staff as occasionally disingenuous.\textsuperscript{41} Essentially, this kind of posturing, whilst interesting to students of political decision-making on defence, cannot be seen as directly representative of strategic thought. Internal comments are usually more revealing: “it is generally agreed that the main tasks of naval aviation in the near future will be A/S and fighter defence... strike aircraft “provide a means of dealing with surface raiders and disrupting enemy sea communications”... carriers are ‘for action between surface ships, to provide air support for... amphibious operations and to locate and destroy submarines and long-range bombers attacking our trade... The United States Navy, on the other hand, is being trained... to attack inland targets with large, heavy, medium range bombers.”\textsuperscript{42}

The example of the NA39 aircraft, later the Blackburn Buccaneer, illustrates this point further. Referred to misleadingly by some as a “bomber”\textsuperscript{43} and linked by others to the Striking Fleet as evidence that the Navy coveted a carrier-borne


\textsuperscript{39} PRO, H of M note of 21 Jan 1954 and D of P/DAW brief on NA39 in Plans 49/4 of 22 Jan 1954, both in ADM 205/94 (for more on the NA39 aircraft, later the Buccaneer, see below).

\textsuperscript{40} PRO, comments on DR(54)4th mtg of 14 Aug 1954 in ADM 205/97.


\textsuperscript{43} e.g., Pierre, \textit{Nuclear Politics}, p.193; Laming, \textit{Buccaneer}, title of ch.1.
strategic nuclear strike capability, the NA39 was in fact an anti-ship strike aircraft. Its secondary land attack role was given undue and misleading prominence by the constant need to adduce additional roles, of marginal importance, in order to protect its funding during successive defence reviews. The earliest work on requirements for a strike aircraft to replace the Westland Wyvern mentions, but discards, the idea of submarine bases as a target of greater importance than surface ships. The first formal draft of the NA39 requirement again begins with the need to replace the Wyvern and lists the required functions as: "1. Strikes on Warships, Merchant Shipping, with torpedoes, bombs and Anti-Ship Rockets. 2. Strikes on Land Installations with bombs and rockets. 3. Minelaying." Only in July 1953 was the requirement to carry a tactical nuclear weapon added; at this stage the aircraft's functions were listed, in order, as attack upon large enemy warships at sea or in harbour; attacks upon other enemy surface ships and vessels; reconnaissance; minelaying; tactical support of ground forces; and only in sixth place attacks upon enemy naval bases and coastal airfields. By September 1953 the wording of the requirement had been finalised in a form that would survive with minor modifications until the design was frozen two years later:

1. Basic requirement. The Admiralty requires an aircraft to search out and strike at enemy warships and other surface vessels with the following major weapons: (a) Target Marker bomb, or (b) Anti-Ship Homing Bomb ('Green Cheese'). These attacks may be carried out against ships in open water or in harbour. Good all weather and night flying characteristics are needed with ability to operate in all parts of the world.

2. Secondary requirement. As an alternative to 1(a) or (b) the aircraft must be capable of carrying the following conventional weapons for attacking smaller vessels and shore targets and for minelaying . . .

DAW insisted, at an October 1953 meeting, that the basic requirement above should not be compromised by any secondary requirement. As late as 1960 official documents show that the primary role of this aircraft was "to search out and strike at enemy warships and other surface vessels." NA39 was designed for tactical and not strategic reasons: to counter the new generation of Russian Sverdlov-class cruisers as the weapon of a Striking Fleet operating like the Home Fleet of World War Two, and not as a land attack bomber for a Striking Fleet conducting an atomic air offensive against the USSR. In conception it had more in common with the

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44 e.g., Navias, Nuclear Weapons and British Strategic Planning, p.85.
45 PRO, papers of Jan 1952 in ADM 1/23245: DNI's preference for submarine bases was overruled by DAW who had overall responsibility for defining the requirement.
48 PRO, NA39 requirement issue 3 of 20 Sep 1953 in AVIA 65/307 ('Target Marker bomb' is a euphemism for the tactical atomic bomb, pace Tim Laming (Buccaneer, pp.10, 24) Green Cheese was never intended to be an atomic weapon).
Chapter 3: Nuclear Ambitions

Barracudas that attacked the *Tirpitz*, or the Swordfish biplanes that attacked the *Bismarck*, than with the new generation heavy bombers of the US Navy. The use of an atomic bomb was key to the requirement, but only because in 1952 the Royal Navy had no other weapon planned that could reliably sink the Soviet cruiser.\(^{50}\)

This did not prevent the nuclear capability's being given a strategic flavour from time to time over the next several years as a goad to the RAF at senior levels. In July 1955, for example, the Fifth Sea Lord suggested to Mountbatten that disparaging Air Ministry remarks about a naval contribution to the strategic deterrent should not go unchallenged: the NA39 would "inevitably exercise some deterrent effect." This effect, it was emphasised, came free with a capability required for 'warm wars' and for attacking shipping.\(^{51}\) Only in the 1960s were studies begun into the possibility of modifying the Buccaneer's radar and navigation equipment for a serious land attack role.\(^{52}\)

**Red Beard**

I have traced the story of the Mk.2 atomic bomb up to the point in July 1953 when the OAW Staff recommended an outline specification and the weapon was added to the NA39 requirement as primary armament. By November, the bomb had been christened Red Beard and a Joint Naval/Air Staff Operational Requirement (OR) issued.\(^{53}\) The existence of Red Beard has been known for many years, and significant detail was given by John Simpson in the 1980s, most of it corroborated by documents declassified later.\(^{54}\) It is worth however reviewing the history of this,

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\(^{50}\) See e.g., Friedman, *British Carrier Aviation*, p.324; the authoritative enthusiast's book on the Buccaneer is also quite clear about the anti-Sverdlov origins of the aircraft: Allward, *Buccaneer*, pp.6-9. On sinking weapons, see also the discussion of nuclear Seaslug and Blue Slug below.

\(^{51}\) PRO, 5SL to ISL of 16 Jul 1955 in ADM 205/106. Mountbatten called for a comprehensive brief on the NA39's nuclear capability as a result, which is preserved in the same file, but even the 'warm war' and anti-shipping roles initially gave the NA39 a low priority in internal Admiralty discussions compared to fighter aircraft. Although Grove notes a somewhat increased emphasis on strike aircraft in ADM 1/25076 (*Vanguard to Trident*, pp.97-8), we should remember that resources were going into the Sea Vixen, Gannet and Scimitar programmes as well as the NA39. The Admiralty sometimes regarded the latter as a cuckoo in the nest: D of P for example suggested in 1953 that "more important aircraft might be threatened" by the NA39 (enc.43-4 of ADM 1/23245), and 5SL made the same point to the Board (minute 4708 of 15 Oct 1953 in ADM 167/143); only in the later 1950s did the NA39's development priority exceed that of other naval aircraft – see e.g., DRP/P(57)30 of 31 Jul 1957 in DEFE 10/276.

\(^{52}\) See PRO, OR/M(64)1 of 16 Jan 1964 and OR/M(64)2 of 6 Feb 1964 in DEFE 10/457, where terrain-following radar is suggested for use in land attack in support of the army.

\(^{53}\) Codenames of the form (colour + noun) were assigned by the Ministry of Supply from a master list supplied by the JIC: see PRO, DRP/P(58)31 of 24 Apr 1958 in DEFE 10/278; OR.1127 was issued, appropriately, on Guy Fawkes Night in 1953: see second issue of 4 Nov 1955 preserved in AIR 2/13728.

\(^{54}\) Simpson, *The Independent Nuclear State*, pp.93, 146, 153; also Grove, *Vanguard to Trident*, pp.98, 199, 212.
the first nuclear weapon delivered to the Royal Navy, for the light it occasionally throws on tactical concepts of nuclear warfare and to correct the impression sometimes given that it was "one of those rare cases where the services had an opportunity to enhance their abilities to perform existing roles and missions without infringing on their rivals’ bureaucratic territory." In fact, although very few relevant Admiralty documents have survived, the Air Ministry and Ministry of Supply records provide periodic evidence of serious disagreements between the services over Red Beard, as well as rather alarming safety problems with the design.

As originally drafted, the Red Beard OR appears to have mirrored closely the design features recommended by the OAW Staff: a weapon of 30-inch diameter for carriage by Javelin and N113 aircraft, based on a plutonium implosion core. The yield requirement may originally have been for flexibility between five and twenty-five kilotons, and the bomb's ballistics were also to be variable to allow high- or low-level delivery. The target date for service entry was 1957. By early 1955 the Air Ministry were unhappy about some of the features they had signed up to: in particular, they were keen to remove some of the emphasis on low-level delivery, which imposed ballistic requirements considered unnecessary for RAF use. A simple free-fall bomb was preferred, the point being made that the RAF already had Canberra aircraft suitable to carry a free-fall bomb whilst the Navy was still waiting for the N113 to carry its retarded version. The Air Staff had also begun to stress what was to become a familiar theme, that the Navy's requirement for Red Beard was somehow frivolous compared to their own, and that the bulk of weapons produced should be allocated to the RAF. One official poured scorn on the Admiralty's idea of basing its requirements for Red Beard upon the space available for storing the weapon aboard aircraft carriers; another described the Navy's requirements as "highly suspect." The Deputy Chief of Air Staff meanwhile outlined a wish for as many as 250 Red Beards for RAF use, to supplement 400 one-megaton weapons in a counterforce offensive against the Soviet bomber force. Although the Red Beard OR was reissued late in 1955, impatience is still evident at the Navy's perceived fussiness over the size, yield and retardation of the weapon. A third issue of the OR in April 1956 separated out the free-fall and retarded versions of the bomb entirely but imposed a still smaller size requirement (28-inch diameter and 2000lb weight), almost certainly as a result of Admiralty lobbying. More Air Staff frustration is evident as a result, especially as Mk.1 Blue Danube deliveries to the V-bomber force were evidently proceeding slowly. At least one official suggested that clear priority be given to the free-fall version of Red Beard.

56 A note of 22 Apr 1955 preserved in PRO, AIR 2/13728 suggests that 5-50kt was the desired range, but OAW/P(54)4 of 8 Apr 1954 in DEFE 7/2340 suggests no strong requirement for more than 25kt.
57 PRO, correspondence of April 1955 in AIR 2/13728; note of Air Staff mtg of 27 May 1955 in AIR 2/13737.
58 PRO, ACAS(OR) to DCAS of 9 Feb 1955, A/ACAS(P) to DCAS of 10 Feb 1955, DCAS to Brundrett of 8 Mar 1955 all in AIR 2/13693.
59 PRO, D of Ops(B&R) note following OR.1127 issue 2 of 4 Nov 1955 in AIR 2/13728.
Beard, which should not be made available to the Navy, or even to other RAF units, “until the needs of the medium bomber force are satisfied.”

It is clear that at this stage the RAF was interested in a fairly high-yield Red Beard for use by Canberras and V-bombers in a counterforce offensive in the first few days of a war. An Air Staff paper of December 1955 argued that “we cannot afford to have our limited resources lying around in carriers miles from the scene of action . . . It is unlikely that naval strike aircraft will be able to deliver attacks until say D+4 at the earliest when the war may be over.” The Admiralty by contrast seems to have clung to the original concept of a small atomic bomb for low-level delivery by new generation tactical aircraft against point targets including, most importantly, ships at sea and in harbour.

During 1956 the Red Beard programme suffered important setbacks. A Ministry of Supply review put back the target date to 1958 for the ballistic (free-fall) version and mid-1959 for the retarded version, which was suffering instability problems during trials at Farnborough. In the autumn the Buffalo series of atomic tests took place in Australia, and AWRE scientists concluded that achieving a yield above twenty-five kilotons with the Red Beard warhead would be impossible. The Green Cheese stand-off anti-ship weapon was also cancelled in August 1956. These problems, paradoxically, made agreement between the Navy and RAF on Red Beard easier: the Air Staff came to realise that it would not be the short-term answer to their problems in arming the V-bombers, and now sought American weapons to fill that gap through ‘Project E,’ whilst the Admiralty began to think of using Red Beard in a stand-off role to replace Green Cheese. This would involve the adoption of a loft or toss bombing technique, in which the aircraft would release its weapon in a climb and then turn away to safety, the bomb continuing on a parabolic trajectory towards its target. Despite protests from DGD, it now appeared that a ballistic Red Beard delivered in this way would be suitable for naval requirements. When issue four of the OR was promulgated in April 1958, therefore, development of the retarded Red Beard was in suspense and the ballistic version, for use by Scimitar, Sea Vixen, NA39 and RAF aircraft, was planned for delivery at the year’s end. A slightly later ‘loft/universal’ version of Red Beard involved only slight changes to the ballistic carcase and was probably the version

60 PRO, D of Ops(B&R) to DDOR2 of 7 Apr 1956 in AIR 2/13737.

61 PRO, DDOR2 to PS/DCAS, CMS.2479/55 of 8 Dec 1955 in AIR 2/13693.


63 Action had already been taken to remove Green Cheese from the NA39 requirement (see papers in PRO, AVIA 65/647), but it was not cancelled as early as Feb 1955, pace Morton in Fire Across the Desert, pp.181-2.

64 PRO, note of MoS mtg of 16 Jul 1956 in AVIA 65/1166.

65 PRO, OR.1127 issue 4 of 21 Apr 1958 in AIR 2/13728 (this is actually the first issue of the OR to mention NA39, although Admiralty documents associate the two as early as 1953; the reason must be that until 1958 the NA39’s future was periodically in doubt, and to imply that the Admiralty’s nuclear ambitions depended upon the aircraft would have risked leaving a hostage to fortune in the defence debates).
delivered to the Navy.\textsuperscript{66} It is somewhat doubtful that a retarded Red Beard was ever deployed, although in 1963 the Admiralty requested permission – which was refused – to conduct ballistic tests of a ‘Mk.3’ Red Beard, which may have been the missing retarded version.\textsuperscript{67}

Unlike the RAF, the Navy seems only occasionally to have considered using alternative tactical nuclear bombs to Red Beard during the 1950s. There were, briefly, suggestions in 1955-56 that a megaton range weapon for NA39 should be procured, but this would have been overkill for naval use. Similarly, the carriage of various American weapons under a ‘Project N’ – evidently an equivalent of the RAF’s ‘Project E’ – was considered on and off for the next several years, but Anglo-American handling arrangements were difficult enough for the RAF on land, and the worldwide deployment of the Navy’s carriers would have presented insuperable problems.\textsuperscript{68}

Further compromises were necessary before Red Beard’s entry into service, and the strategic context for the weapon in 1960 was very different from that envisaged in 1952. This will be touched upon in the next chapter. Here, finally, I would like to mention some of the safety problems associated with Red Beard – problems which particularly affected its deployment on carrier aircraft. It became clear very early on that the small size required of the weapon would preclude in-flight insertion of the fissile core; the weapon would therefore have to be armed just before flight and the aircraft would have to take off in this condition.\textsuperscript{69}

Unfortunately contact or graze fuze options were being considered in issue two of the OR, and by June 1955 Edward ‘Dizzy’ Davis, a retired Air Vice Marshal and senior Ministry of Supply official, was concerned at the risk of a possible two-kiloton nuclear yield in the event of an accident. The extremes of temperature built into the requirement, largely dictated by the need to operate from carriers based from the Clyde to Singapore, did not make the weapon easier to design safely.\textsuperscript{70}

The problem was further worsened by the Navy’s need to carry Red Beard externally on Scimitar and Sea Vixen aircraft, with very little clearance between the bomb and the carrier’s flight deck: a special strike variant of Scimitar with internal

\textsuperscript{66} The first mention of the ‘loft,’ ‘loft/ballistic’ or ‘universal’ version I have found dates from June 1958; correspondence in PRO, AIR 2/13774 suggests that this was the Navy’s weapon. This is the ‘No.2’ bomb mentioned in documents (cf. the initial ballistic version ‘No.1’) and should not be confused with the ‘Mk.2’ Red Beard, a version with in-flight insertion of the fissile core, deployed in about 1961.

\textsuperscript{67} See correspondence of 1963 and 1964 in PRO, PREM 11/4720.

\textsuperscript{68} On megaton weapons for NA39 in 1955-56, see PRO, DDOR2 to PS/ACAS CMS.2749/55 of 8 Dec 1955 in AIR 2/13693 and COS(56)50th mtg (CA) of 15 May 1956 in ADM 205/166; on ‘Project N’ see e.g., notes of mtgs 8 Dec 1959 and 9 Mar 1960 in AVIA 65/1166, and esp. Hartley Library, Mountbatten to Thistleton-Smith of 6 Apr 1959 in MB1/1586.

\textsuperscript{69} Penney played down the associated risks in PRO, COS(54)122nd mtg (CA) of 17 Nov 1954 in AVIA 65/1148; the problem was resolved in the Mk.2 Red Beard from 1961 onwards.

\textsuperscript{70} PRO, OR.1127 issue 2 of 4 Nov 1955 in AIR 2/13728; Davis note of 9 Jun 1955 in AIR 2/13737.
weapons stowage was cancelled in mid-1955. By the fourth issue of the OR in 1958, all of these risks had nevertheless been accepted:

In aircraft carriers the bomb may remain up to 6 hours on the flight deck. . . for the majority of this time the ambient temperature will be within the limits specified for the warhead . . . Where the present design does not give sufficient deck clearance for landing without possible damage to the weapon this limitation is accepted.

The possibility of a small nuclear yield in an accident – perhaps 0.1 kt – was again raised in correspondence in 1962. None of this is particularly reassuring, although as I shall explain in chapter four clearance for the live carriage of Red Beard by Scimitar and Sea Vixen aircraft was probably never granted.

Other enthusiasms

Red Beard did not represent the Navy’s only interest in Britain’s nascent nuclear weapons programme during the 1950s. Various other more or less realistic ideas were mooted during the decade. All, for one reason or another, fell by the wayside, but a short account of the various projects will nevertheless be of some interest.

As we saw in chapter one, the idea of a long-range ballistic rocket carrying an atomic warhead from a surface ship or submarine was mooted almost as soon as news of the atomic bomb became public. As we shall see in chapter five, the idea was eventually adopted. It would be quite wrong however to extend the story of the submarine-based deterrent backwards in time, by seizing upon every mention of a similar idea prior to 1962 as evidence that the Navy wanted the American Polaris system from an early date. In fact, Britain’s adoption of Polaris arose from a unique set of political, technical and strategic circumstances in the early 1960s. In 1953, when Williams (DOR) provoked a brief debate within the Naval Staff with a paper on ‘Long Range Ballistic Rockets,’ the circumstances were quite different.

Williams noted that interest in ballistic rockets was reviving, with the possibility of smaller warheads and with worries about the vulnerability of bombers, manned or unmanned, in level flight. The Navy, he felt, should state an interest in ballistic rocket development – a study contract with industry was expected soon – since if the case for the replacement of level-flight vehicles held good on land, then it held good at sea too. Ship-launched rockets might also require less range to reach targets in the USSR than land-based rockets in the UK, although guidance and vulnerability were also concerns. The latter would probably dictate the use of a ‘submersible.’ A range of responses emerged: DGAW noted encouragingly that shorter range requirements might mean that a ship-launched rocket could be built sooner than its land-based equivalent. DNO agreed, noting further that vital targets could well be out of range of land bases and that launch from an unknown and

71 Friedman, British Carrier Aviation, pp.324-5.
72 PRO, OR 1127 issue 4 of 21 Apr 1958 in AIR 2/13728.
73 PRO, AV/521/033 of 9 Apr 1962 in ADM 1/27827.
74 PRO, Williams to DGD of 19 Nov 1953 in ADM 1/26924.
possibly undefended sector would be possible. He also asked however “whether the Navy is required, or will be required, to act in a strategic role . . . or whether the Navy would not be better and fully employed keeping the sea lanes open.”

Although DGAW had suggested using a King George V-class battleship hull, DNO preferred to think of this as a likely platform for Sealslug surface-to-air missiles to protect shipping, leaving the ballistic rocket to be mounted on a mere converted merchantman. The Superintendent of the Admiralty Gunnery Establishment (Supt AGE) reinforced the point that guidance would be fiendishly difficult. By February 1954 DOR, undeterred, had drafted a paper for DCNS making many of the same points enthusiastically: “The proper use of the sea for mobile launching sites could immensely increase the magnitude of the threat . . . which we could impose on Russia.”

Amusingly, DNI noted no evidence of Russian research in this area, just a day after the formal directive is now thought to have been signed to arm Soviet Zulu-class submarines with ballistic missiles.

Again in February 1955 the subject was raised at a working level within the Admiralty, this time in response to a paper from Supt AGE on the technicalities of the rocket, control system, launcher, handling gear and shipborne guidance equipment. The prospects for a short-range shipborne rocket for development within twelve years, eight years ahead of a long-range land-based rocket the RAE was known to be studying, were assessed to be fairly good. Stellar or land fix guidance could give a typical miss distance of one eighth of a mile at 250 miles range, or one mile at 750 miles. DNO replied pessimistically, noting that RAE’s ideas for mid-course guidance of the land-based missile were impossible to apply at sea. DTSD, however, was on the side of the enthusiasts, drawing a chart to show that even a 750-mile range missile would threaten significant areas of the USSR and asserting that “if the Navy does not grasp the ballistic rocket it will in due course – with the passing of the strategic bomber and the need for strike carriers – be relegated to the status of an escort force.”

Although the technical problems were novel, the strategic arguments used here were familiar in the context of the carrier air debates. Ship-launched ballistic rockets would multiply the deterrent, increase the problems of defence by varying the angle of attack and, if mounted on a submarine, reduce vulnerability. It is clear that at this period the ballistic rocket was thought of very much as a successor to the carrier aircraft in its (controversial but not especially important) deterrent role, and not as a qualitatively different system offering secure retaliation and minimum deterrence. It seems clear, too, that there was no more enthusiasm – indeed probably less, since the rocket was inappropriate for other carrier roles, including tactical use against naval targets.

Mountbatten became First Sea Lord in April 1955, and it is clear that this made an immediate difference to the way new naval developments, including the
ballistic rocket and its submarine, were regarded. In August, he wrote to the Controller outlining a plan “for the launching of ballistic rockets from nuclear powered submarines in the Barents Sea, Persian Gulf, and possibly the Pacific, pointing out their deterrent value with a Megaton head . . . it seems that we should design our nuclear-powered submarine around the medium range ballistic rocket, and I should like a note on this from you and DCNS in due course.” A range of 2500 miles with an 1800lb warhead seemed possible, and a Ballistic Rocket Study Group was meeting with input from Admiralty scientists. Mountbatten’s response to the progress of the SSN and Polaris projects in the US, in particular, was enthusiastic, and I shall return in chapter five to consider the part he played in subsequent developments. By February 1956, he had made the link between work in the UK and US on ballistic rockets explicit, and in March a ‘strike submarine’ was briefly mentioned in a future construction plan put to the Board. By this time missiles were new and sexy, certainly; they also perhaps improved the case for a naval share of the deterrent. But there was no enthusiasm for paying for them. Not only working-level studies, but also such references as were made at higher levels in the Admiralty, were very clear on this point: “any development of ballistic rockets must be made on a national and not a service basis” . . . “it is clear that a decision to change to Ballistic Rocket warfare could only be made on a national basis as a result of an extensive review of its strategic possibilities and its economic limitations” . . . “DNO has always felt that, if the Navy is to indulge in this type of strategic warfare, it must be as part of the national effort and not at the expense of our existing naval vote.” This was to become a very familiar refrain in later years. In 1956, whilst his advisers in the Naval Staff urged him to consider flexible carrier capabilities rather than a “militarily and politically small” contribution to the deterrent, Mountbatten began to point out that we might take advantage of US work in this area. The story of the Royal Navy’s interest in missile submarines became thereafter the story of Polaris, and will be treated separately in chapter five.

Another enthusiasm pursued off and on during the mid-1950s was the ‘sneak craft’ weapon, already recommended by the OAW Committee in 1953. By April 1954, DTASW had drafted a requirement which was passed to the Ministry of Supply. By the end of the year, the project had acquired the codename Cudgel — perhaps more appropriate than the Army’s equivalent, the atomic land mine Brown Bunny. An atomic defensive naval mine appears also to have been considered. In the summer of 1955 a further draft of the requirement, incorporating more serious

79 Hartley Library, Mountbatten to Ctrlr, 17 Aug 1955 in MB1/1586
80 PRO, notes of mtg on future submarine policy of 2 Feb 1956 in part 10C of ADM 205/112; PD R51/1700/2 under cover of Board memo B1056 of 6 Mar 1956 in ADM 167/146.
82 PRO, DOR paper of 27 Sep 1956 and other papers in part 10C of ADM 205/112.
83 PRO, M/TASW06/54 of 18 Apr 1954 under cover of DCNS to MoS in AVIA 65/1164.
84 PRO, DRP/P(54)10 of 10 Mar 1954 in AVIA 65/1113.
thought on delivery, was put forward: Red Beard or an equivalent warhead could be modified “for use underwater with the ‘X’ Craft, world wide.” The warhead package was to be watertight, pressure resistant to 300ft, non-magnetic and with sufficient shielding to protect the crew of a parent submarine from radiation for four weeks, and that of the X-craft itself for a further four days. Manual insertion of the fissile core was envisaged, for which purpose the craft would bottom immediately before attack. Accounts of wartime missions by X-craft, human torpedoes and other midget vessels suggest that to deliver an atomic bomb in this way would have been hair-raising in the extreme. Of the six crews involved in a raid on the Tirpitz in 1943, for example, four failed to attack and the other two were taken prisoner, finding themselves aboard the target vessel itself when the charges exploded. The VCUs of the commanders involved would have been posthumous if atomic weapons had been involved. Nevertheless it is clear that such operations were seriously considered postwar. Molotovsk (now Severodvinsk) and Arkhangelsk were certainly considered as targets; two commentators have specifically named Leningrad as another possibility whilst a third suggests Murmansk. Four midget submarines were launched by Vickers in Barrow during 1954 and 1955, but the idea of arming them with an atomic weapon was eventually dropped. The Ministry of Supply’s file records the cancellation of the requirement in 1956 “because of difficulties in the design of the weapon.”

The Navy got somewhat further with the development of a nuclear version of the surface-to-air missile Seaslug. Seaslug had been conceived as early as 1943 in response to German anti-ship missiles used during the Salerno landings, and its development counts as one of the most protracted in British defence history; it finally went to sea operationally in 1962. The story of Seaslug’s projected nuclear version appears to begin in 1955 with studies into the use of the missile, or a separate weapon Blue Slug which would use the same launcher, in an anti-ship role. A Ministry of Supply brief of 1953 shows that the idea of an anti-ship missile had originated in the need to bring Sverdlov-class cruisers to action at first contact, beyond 6-inch gun range and before carrier or land-based aircraft could be brought to bear. Initially, it was apparently accepted that a ship-to-ship guided weapon could inflict only superficial damage. Later, the idea of Blue Slug as a sinking weapon gained hold: for this, a nuclear warhead was required. During the summer of 1955, a draft staff target for such a warhead appears to have been drawn up in the Admiralty’s Gunnery Division, and by December the possibility of atomic

\[85\] PRO, M/USW.1007/58 of 12 Jul 1955 in ibid.

\[86\] PRO, FOSM note of 3 Nov 1952 in ADM 1/24063; Preston, ‘United Kingdom’ in Conway’s All the World’s Fighting Ships 1947-95, p.527; Friedman, probably based on his reading of the Ship’s Cover documents at Greenwich, in The Postwar Naval Revolution, p.26; Fenton, ‘Navy planned midget submarine to plant atomic bombs in Russia’ in The Daily Telegraph 5 Aug 1998.

\[87\] PRO, MoS note of 2 Jul 1956 inside cover of AVIA 65/1164.

\[88\] PRO, notes of Mar 1955 in AVIA 54/1805 (AWRE papers on Seaslug also begin in 1955 – see class list for ES 1/1237-47); brief for CGWL of 26 Jun 1953 and DNC report ‘Blue Slug against large warships’ of Mar 1954 in ADM 281/62. One is reminded of HMS Norfolk and Suffolk making contact with the Bismarck in 1941.
warheads for this and other missiles, including Seaslug itself, had been mentioned to the DRPC.\textsuperscript{89} Blue Slug was cancelled in 1956, but the Admiralty continued to consider the adaptation of Seaslug for the anti-ship role. The Ministry of Supply and AWRE meanwhile began to devote attention to the problems of developing a small (500-600lb) warhead for a guided weapon.\textsuperscript{90} The Admiralty also began to take account of the availability of nuclear warheads in its discussions of suitable platforms for Seaslug including carriers, cruisers and destroyers.\textsuperscript{91} By the middle of 1957, AWRE had concrete proposals for a 450lb five- to ten-kiloton warhead, Blue Fox, and a 250lb one-kiloton warhead, Pixie, for use on surface-to-air guided weapons (SAGW). These were probably tested in Australia during the Antler series in the autumn. Seaslug contractors Armstrong Whitworth were asked at least to consider using Blue Fox, but decided only the smaller Pixie would be suitable. Work on a nuclear warhead for Seaslug was however taking a lower priority than work on nuclear SAGW for the air defence of the UK. The Pixie warhead was wasteful in fissile material and unsafe; the Ministry of Supply, in a paper for the DRPC in March 1958, did not propose to continue its development.\textsuperscript{92}

Mountbatten however appears by this stage to have been led to believe that a US warhead for Seaslug might become available, and also that the nuclear version would be useful against long-range air targets including bomber formations, as well as in the anti-ship role.\textsuperscript{93} The Cabinet Defence Committee decided after a review in December 1957 to proceed with Seaslug, but also to separate some longer-term improvements, including the nuclear warhead, into a Seaslug Mk.2 project in order to get the basic missile into service as soon as possible. By 1959 the case for Seaslug Mk.2 rested “primarily” on the nuclear warhead, which along with performance and range improvements would allow the missile to be used against aircraft formations, individual low-flying and supersonic aircraft, and ships at ranges of over twenty miles.\textsuperscript{94} Initial production orders for Seaslug were now being

\textsuperscript{89} Enc.38/9 of PRO, AVIA 54/1809 have been removed from the file and remain classified, but relate to the draft staff target. A requirement for nuclear warheads for shipborne SAGW must have been mentioned also in DRP(AES)/P(55)36, the Air Ministry response to which is DDOR2 to PS/ACAS of 8 Dec 1955 in AIR 2/13693; note of conference on FAA of 16 Dec 1955 in ADM 205/112 also mentions the requirement for a ship to ship guided weapon with a nuclear warhead.

\textsuperscript{90} PRO, DNO note of 26 Jun 1956 in AVIA 54/1805; RAE note of 12 Dec 1955 and other papers in AVIA 65/906.

\textsuperscript{91} PRO, Board memo B1056 of 6 Mar 1956 and minute 4982 of 8 Mar 1956 in ADM 167/146; also Friedman, \textit{The Postwar Naval Revolution}, pp.108, 138/9, 150.

\textsuperscript{92} PRO, papers in AVIA 65/906, esp. DGAW to ACAS(OR) of 9 Aug 1957, CGWL (Cockburn) to DGAW of 25 Jun 1957, DGGW note of mtg with ARDE 30 Aug 1957; also ADGW(N) to Armstrong Whitworth of 15 May 1957 in AVIA 54/2073. Blue Fox is the warhead later referred to as Indigo Hammer (see class list for ES 1/1899-1904). The Chiefs approved the idea of nuclear warheads for the air defence of the UK at COS(57)29th mtg of 9 Apr 1957 (see note of 10 Apr 1959 in AIR 20/10805). Pixie’s problems are mentioned in 3rd draft of 7/CW/4153 of Mar 1958 in AVIA 65/2017.

\textsuperscript{93} PRO, minutes of ISL’s weekly mtg of 11 Sep 1958 in ADM 205/172.

\textsuperscript{94} See the account of Seaslug development in PRO, DRP/P(59)93 of 15 Sep 1959 in DEFE 10/357.
placed, but the nuclear warhead was only to be fitted to "a small proportion" of the Mk.2 missiles after 1965. A two-kiloton warhead known as Gwen, or the two- to ten-kiloton Tony, would be used; both were probably based on US designs. Another US warhead, RO106, was later mentioned. In 1960, a brief to the First Lord noted that plans now existed for ten percent of Seaslug Mk.2 missiles to be nuclear tipped, but that even a proposal to fit missiles 'for but not with' the warhead had yet to be approved officially. The Board concluded that:

It was doubtful whether the use of such a weapon would ever be allowed in limited war; and even if this doubt were set aside, the nuclear-headed Seaslug would be prohibitively expensive for use against many of the surface targets which a cruiser would normally be expected to engage, and would normally be useless in the Army support role.

Ultimately, although Seaslug Mk.2 went to sea in 1965 – and introduced a secondary anti-ship role – and although the County-class destroyers were completed with special storage for nuclear weapons, the idea of nuclear Seaslug was abandoned in 1962. This decision can be explained with reference to cost, to the weapon's relatively weak tactical rationale, to the somewhat disappointing service performance of the conventional version, and to the shift in strategic thinking, which chapter four will cover in more detail, away from global war and towards limited and conventional war outside Europe.

Nuclear anti-submarine warfare (I)

We have seen that the earliest Admiralty submission to the OAW Committee in 1951 on the use of nuclear anti-submarine weapons was ambivalent. It is curious that although the Royal Navy continued to be heavily preoccupied by anti-submarine warfare during the 1950s, and although the US Navy enthusiastically pursued the development of nuclear anti-submarine weapons from as early as 1950, there is very little evidence of interest in the UK in these weapons until at least the middle of the decade. The damage an underwater atomic explosion could do to a submarine was demonstrated at Bikini in 1946. The US Joint Chiefs formally requested work on a nuclear depth bomb (NDB) in 1951 after the Hartwell study's recommendations of the previous year; and the US Navy deployed the weapon in 1955 after another encouraging test against scale model submarines in the Pacific.

95 PRO, Board memo B1274 of 22 Jun 1959 in ADM 167/153; on Gwen, see DOR(C) to DOps(ATO) of 30 Jun 1959 in AIR 2/13735, but on Tony, see DRP/P(59)93 of 15 Sep 1959 in DEFE 10/357, and on RO106, see DAWD brief to Minister of Aviation of 3 Oct 1961 in AVIA 65/1836.

96 PRO, H of M(I) brief of 13 Oct 1960 'Limited War Study: the Chequers Agenda' in ADM 1/27810; Board minute 5411 of 20 May 1960 in ADM 167/156. A total of 48 warheads was apparently planned (Nash to 1SL of 1 Dec 1960 in ADM 1/27876).


98 For the Hartwell study, see retrospective accounts in PRO, DEFE 7/2084, Lamplight conference papers, and KCL Archive, US Nuclear History, MFF16/00564 'Project...
Some in the UK were certainly vaguely aware of the introduction of the NDB, and a requirement for a UK version was at least suggested by the Admiralty at the end of 1955. When in 1956 the Admiralty’s Atlantic War Working Party presented its conclusions, however, NDBs were prominent only by their absence. Arleigh Burke, invited to comment by Mountbatten, was surprised that their effectiveness had not been recognised. Instead, the earliest serious advocacy of nuclear anti-submarine weapons in the UK came from RAF Coastal Command, whose commander wrote to the Air Ministry in October 1956, and the Admiralty in June 1957, asking what was to be done about the possibility. By May 1957, DUSW had also taken up the charge in the Admiralty, circulating widely a report based on US information as an annexe to a study of anti-submarine detection and weapons. This report considered the development of air-launched active homing torpedoes but also, in the light of the various problems these weapons had experienced, the alternative of the NDB. It mentioned a number of problems – cost, size, weight and difficulties with use in shallow water or in the vicinity of ‘blue’ forces – but concluded that “a Nuclear Depth Charge may well be the only type of aircraft A/S weapon that will deal effectively with the nuclear-powered submarine using high speed . . . If supplies of fissile material eventually permit, it is considered that a nuclear depth charge . . . will be desirable for UK use.” DUSW wanted an NDB small enough for use by naval Gannet aircraft or Whirlwind helicopters, but it continued to be the RAP that made the running in drafting a formal requirement. By September, an Air Ministry working party had recommended the development of an NDB as a matter of urgency, envisaging a weapon of 28-inch diameter, 2000lb weight and thirty-kiloton yield, carried in pairs by a Shackleton maritime patrol aircraft. The suggestion met with opposition within the Air Ministry because of conflict with Bomber Command requirements, but was raised as an OR to the DRPC in January 1958. A modified Red Beard warhead was requested, and the threat to the UK from Soviet missile submarines, as well as the threat to Atlantic sea communications from the SSN, was mentioned. By this time, a tactical investigation at Woolwich had also interested Mountbatten in the possibility once again. It appears however that the British government had given some form of undertaking to the US at the end of 1957 not

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99 See papers in PRO, DEFE 7/2084; DDOR2 to PS/ACAS of 8 Dec 1955 in AIR 2/13693.

100 PRO, Mountbatten to Burke of 22 Jan 1957 and Burke to Mountbatten of 11 Jul 1957 in ADM 205/204.

101 PRO, AOCinC to USS Air Min of 29 Aug 1957 (mentioning earlier letter) in AIR 2/13692; AOCinC to Mountbatten of 18 Jun 1957 in ADM 205/204. Work on OR.1156 for an NDB appears to have begun within the Air Ministry in March 1957 (DRP/P(59)67 of 8 Jul 1959 in DEFE 10/357).

102 PRO, USW1/198/15, based on US information obtained in August 1956, dated Mar 1957 and circulated 16 May 1957 in AIR 2/13692.

103 See papers in PRO, AIR 2/13692 and AIR 2/13760. esp. Science 2/434 TS Pt II of 26 Nov 1957 in the latter; also Mountbatten to Burke of 14 Jan 1958 in ADM 205/179.
to produce an NDB. Correspondence on the subject continued to suggest a certain amount of controversy. Although a Joint Naval/Air Staff Requirement was drafted in the summer of 1959, the Admiralty was keen to have a British weapon small enough to carry on its own aircraft whilst the Air Ministry began instead to advocate the use of US NDBs which, as we shall see in chapter five, were deployed during the 1960s. The joint requirement may never have been issued formally, and by early 1961 the Admiralty once again had no clear plans.

The Royal Navy's failure to push for nuclear anti-submarine weapons in these years should be understood in practical terms. The cost in money and fissile material would have been significant. The weapons would have been difficult to distribute in numbers around the fleet, and probably too large and heavy for carriage in the helicopters now replacing Gannet fixed wing anti-submarine aircraft. There were tactical problems, both with the use of an NDB in shallow water or near to friendly forces, and with the use of sonar in the aftermath of an underwater explosion. Although as we have seen there was interest in carrying US nuclear weapons including NDBs under a 'Project N' until at least 1959, storing any such weapons would have been far more difficult for the Navy than for the RAF. Getting permission for the use of any NDB would have been troublesome in most circumstances. Homing torpedoes and new sonar technologies offered alternative possibilities for combatting fast SSNs which, as we shall see in chapter five, could not be discounted. Strategic objections to the use of nuclear weapons at sea, as we shall see in more detail in the next chapter, were also mounting as the Navy considered operations in limited and extra-European conflicts.

Conclusions

I have surveyed the various nuclear weapons projects in which the Royal Navy was involved during the 1950s and early 1960s, concentrating in each case on working-level and tactical issues and attempting to give an impression of the strength or weakness of interest shown in each. The overall picture, it must be allowed, is of a distinct lack of success or even enthusiasm. Red Beard was delivered late and, at least until the arrival of the Buccaneer in 1962, would have been extremely dangerous to assemble and use. Even the Buccaneer took second place in Admiralty plans to fighter and anti-submarine aircraft, and British ideas of the Striking Fleet were markedly different from those of the Americans. Various other nuclear ideas were pursued desultorily, but lead times were long and in no case did the Admiralty invest significant financial or political capital.

Mountbatten was keen on any new technical development, and breathed some life in particular into investigations of ballistic rockets. Nuclear Seaslug came within three years of deployment. Some naval writers during the mid-1950s did begin to advocate a deterrent role: a junior officer wrote in the Naval Review of his

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105 See the account of progress in PRO, DRP/P(59)67 of 8 Jul 1959 in DEFE 10/357, which suggests that a formal requirement was on its way to the MoS but appears to be contradicted by notes of DA Arm mtg 8 Dec 1959 in AVIA 65/1166; also Admiralty paper of 6 Feb 1961 in AIR 20/10306; papers in AIR 2/13692, AIR 2/13678.
frustration with the Navy's role as "international policeman, goodwill ambassador and British Council official" and suggested instead a permanent deterrent task force on a war footing.\textsuperscript{106} In the Navy League's journal, such views were a little more common; the September 1955 edition carried a centrefold picture of a Sea Vixen circling a carrier, dramatically captioned "The Deterrent.\textsuperscript{107} But a broad reading of the sources shows, I suggest, that such ideas had little importance for the Navy as a whole. More typical contributors to the Naval Review merely noted the declining attraction of broken-backed warfare and the rise of the deterrent argument, offering no prescription of their own, or defined 'deterrent' more widely to include "the will and resolve of the NATO allies to resist aggression and go on fighting until the enemy is finally and assuredly vanquished," or resorted to restating a visceral belief in the need for a 'balanced' fleet:

Whatever may happen the sea will not dry up and it will be for the Navy to ensure that it be used to the greatest possible advantage of the Commonwealth and Empire and their allies. That must always be its main task.\textsuperscript{108}

I shall argue further in the next chapter that among the numerous strands of thought on nuclear strategy in the late 1950s and 1960s there was little serious naval enthusiasm for any that involved the military use of nuclear weapons.

The Navy's involvement in Britain's atomic testing programme during these years tells a similar story. Only five naval personnel appear to have worked at the AWRE.\textsuperscript{109} Although the Navy improvised a task force of ships and boats for the various test series at the Montebello Islands and Christmas Island, expended a frigate, and even provided commanders for Hurricane and Mosaic, in Rear Admiral David Torlesse and Commodore Hugh Martell, its willingness to cooperate was not open ended. In 1950, Bruce Fraser had refused point blank as First Sea Lord to release Bill Cook, later Penney's deputy and an important atomic scientist in his own right, from work on submarine detection - "the Navy's most important research project." Fraser himself later declined to succeed Portal as Controller Atomic Energy, and the Navy also refused to offer weapons experts to join the RAF's Squadron Leader John Rowlands in building the first atomic device.\textsuperscript{110} The

\textsuperscript{106} PM, 'A Lieutenant Looks at the Navy' in The Naval Review July 1956, pp.314-21; see also Derisley Trimmingham, 'The Naval Dilemma' in \textit{ibid.}, pp.354-7.


\textsuperscript{109} VAdm Patrick Brooking (Retired) was assistant to William Penney; three naval scientists and a LtCdr are mentioned at Aldermaston in PRO, ES1/146 during the years 1952-4.

\textsuperscript{110} Gowing, \textit{Independence and Deterrence}, Vol.1 p.46; Cathcart, \textit{Test of Greatness}, pp.116, 137.
task force commander originally appointed for Grapple in 1957, Rear Admiral Kaye Edden, bowed out in favour of an airman. When Commodore Peter Gretton later fell ill the senior service was represented only by a Captain.\textsuperscript{111} This is hardly suggestive of an endeavour of burning importance to the Navy.

There seems in addition to have been a lack of energetic high-level naval input into nuclear weapons procurement policy. Although DCNS, and below him DGD, were in general responsible for nuclear weapons matters within the Admiralty, they seem only once to have been given authority to conduct a root and branch review. This came late in 1954, initially as part of McGrigor’s Review of Naval Policy but later as a separate exercise. Although the documents covering the review appear to have been lost,\textsuperscript{112} it may have provoked the roughly contemporary initial interest in nuclear Seaslug and the fuller definition of the requirement for Cudgel. The Admiralty appears eventually to have submitted a paper to the DRPC’s AES subcommittee, and then to have completed a study of the numbers of weapons required. A long wish list resulted. To the existing requirements for Red Beard and the ‘sneak’ weapon were added megaton weapons for carrier aircraft, a Seaslug nuclear warhead, a long-range anti-submarine weapon and a deep depth charge, an air-to-air guided weapon, a small and a long range SAGW, and a ballistic missile warhead for a submarine. The Air Ministry’s scathing response to this paper survives, and is important in understanding the lack of progress with naval nuclear weapons requirements:

> Apart from the Megaton bomb for strike aircraft not one of the Naval requirements add to the deterrent, in fact they all detract from it, since we have only a very limited atomic potential and every weapon we develop which cannot be used to attack the enemy where it hurts most is wasted.

> In practically every case the R.N. have suggested weapons which, because of their small size are grossly extravagant in fissile material, such weapons by their very nature seriously reduce our potential.

> I strongly recommend that these new Naval proposals should be opposed in principle as they do not in any way contribute to the deterrent.\textsuperscript{113}

Histories of the Britain in the postwar period repeatedly stress the expense of defence programmes and the competing demands of the civilian economy, and it is no surprise that the atomic weapons programme, paying poorly and imposing unwelcome and unpleasant working conditions, suffered repeated manpower shortages. As Cathcart puts it, “the story . . . is one of improvisation and struggle, of hesitation and last minute rush, of high stakes and low cards.”\textsuperscript{114} Although Britain’s nuclear programme was gathering pace during the 1950s, fissile material and technical manpower remained critically short. Precise figures have never been declassified, but Simpson’s calculations, based on the theoretical throughput of Britain’s reactors, show that throughout the 1950s there can hardly have been more

\textsuperscript{111} Oulton, \textit{Christmas Island Cracker.} pp.28-9.

\textsuperscript{112} I D Goode, MoD, pers. comm. 28 Aug 1997.

\textsuperscript{113} PRO, DDOR2 to PS/ACAS CMS.2479/55 of 8 Dec 1955 in AIR 2/13693.

\textsuperscript{114} Cathcart, \textit{Test of Greatness,} p.7.
than a hundred British nuclear weapons. It is not surprising that, whilst aware of the thousands of tactical nuclear weapons rolling off American assembly lines, the British chose to allocate their own output almost exclusively to the RAF’s V-bombers, and indeed went to the trouble of supplementing the total through negotiations with the Americans under ‘Project E.’ The RAF, quite simply, was the service desperate to push the nuclear weapons programme forward for strategic reasons.

The Royal Navy remained wedded to the tactical idea of the ‘offensive’ and to the aircraft carrier, and this goes some way towards explaining the lack of enthusiasm we have seen in some quarters for broken-backed warfare. But there seems little evidence to support the argument that it therefore desired a significant nuclear offensive role or an involvement in strategic bombing. Various statements on the deterrent value of carrier aircraft were introduced into the high-level debates when carrier modernisation plans were under threat. At a policy implementation level, however, the Navy’s interest in nuclear weapons remained tactical: they were a means reliably to destroy certain targets of naval interest. The Navy invested little capital in nuclear weapons development, and played second fiddle to the RAF even in the one programme to be completed successfully, Red Beard.

Fig. 13: *Aleksandr Suvorov*

The imposing *Sverdlov*-class cruisers were laid down beginning in 1949; the first was completed at the end of 1951. *Aleksandr Suvorov* was one of many to operate in the Baltic Fleet. The Royal Navy feared their use in war against convoys in the North Atlantic, and the NA39 strike aircraft, later the Buccaneer, was designed to sink them with Red Beard tactical nuclear weapons (pp. 102-4).
Fig. 14: Buccaneer and Red Beard

This technical drawing from Blackburns, the designers of the Buccaneer, shows Red Beard nestling in the aircraft's specially designed weapons bay (Laming, *Buccaneer*).
Fig.15: Red Beard's eye view

HMS *Victorious* was almost certainly the first in the Royal Navy to embark nuclear weapons, in 1959 or 1960. At first, it was considered unacceptably dangerous to land on a carrier with a live Red Beard weapon, since these were carried externally under the wings of Scimitar or Sea Vixen fighters. This photograph was taken from the internal weapons bay of a Buccaneer on its final approach to landing on *Victorious*. Red Beard would have been safer here, although it is not clear that a landing with a live weapon ever took place (pp.107-8, 140-3).
Admiral of the Fleet Earl Mountbatten of Burma, as First Sea Lord, shows Her Majesty the Queen the external booster rockets of a Seaslug missile, one of the displays at the Fairlead conference at Greenwich in 1957. At this stage a nuclear-tipped version of Seaslug was still envisaged (pp. 111-3; Hartley Library, MB2/S10).
Chapter 4: Nuclear Stalemate

Lord, help us,
to gather our strength in difficult times,
that we may go on living,
believing in the meaning of future days.
Be so good as to give us that hope.
Be so good.
(Polish prayer)

I have described at the end of chapter two the political difficulties faced by the Royal Navy during 1956-57 in trying to cling to the notion of broken-backed warfare. I shall now look at naval reactions to the development of other nuclear strategies in the mid to late 1950s and 1960s. In particular, I shall focus on the implications of the growing realisation that American nuclear superiority was a wasting asset; that a nuclear stalemate between East and West was not far away, at least in ‘strategic’ and thermonuclear weapons; and that an unlimited global war would therefore be a catastrophe for Western civilisation. I shall argue that various reactions to this new situation were possible, depending largely upon one’s original prejudices. For naval thinkers at least, one predominantly conventional concept of war at sea - broken-backed warfare after the initial air-atomic phase - came to be replaced with two others: limited war in extra-European waters, and pre-nuclear conventional warfare in the North Atlantic. This continued lack of enthusiasm for the use of nuclear weapons in warfare goes some way towards explaining the relatively low priority given to the various projects described in chapter three, and some of the Navy’s attitudes in the endless high-level debates with the RAF. It also throws interesting light upon the Navy’s dislike for programmatic strategies per se and its preference for flexibility: for a balanced fleet centred on the aircraft carrier first, and only then for worrying about what it might be required to do.

Reactions to massive retaliation

Until around 1953, there was little dissent in Britain, or indeed the US, from the dominant view that a future global war against the USSR would involve an initial atomic air offensive and a subsequent phase of broken-backed operations, ‘perhaps especially at sea.’ Air enthusiasts would tend to emphasise the former, and sceptics the latter, but the two visions could be reconciled without significant controversy, as the 1952 Global Strategy Paper demonstrated. This consensus began to be threatened however as time went by. The expense of Korean rearmament began to tell on both sides of the Atlantic, and during 1953 the US administration began to formulate its ‘New Look’ strategy, calling for massive retaliation with nuclear weapons as a response to a much wider range of situations than previously envisaged. The strategy was enshrined in the policy document NSC 162/2 in
October 1953 and, more famously, in a speech by Secretary of State Dulles the following January.\(^1\)

Already, strenuous efforts had been made to build up US air-atomic capabilities. Strategic Air Command (SAC), under the leadership of General Curtis Le May from late 1948, was developed into a formidable force with but a single purpose: to destroy the Soviet Union, if required, in the shortest possible time. Le May was, in Williamson and Rearden’s understatement, “not a sophisticated strategist.”\(^2\) Recent estimates suggest that the US warhead stockpile grew from about fifty when LeMay took over SAC to over a thousand five years later.\(^3\) It became more realistic to talk of a war lasting just six weeks, and so in June 1953 the UK Chiefs of Staff were asked to consider the implications of basing their planning upon this short war target.\(^4\) This ‘June Directive’ was less a turning point than a Whitehall ploy in the battle over the 1955-56 defence estimates, and I have argued in chapter two that the Royal Navy was successful for a number of years afterwards in keeping the idea of broken-backed warfare alive. It did however have a lasting impact in provoking the first broadside in a long battle by Rear Admiral Sir Anthony Buzzard, then Director of Naval Intelligence, to promote his idea of limited or graduated deterrence, rather than massive retaliation, in a nuclear war.\(^5\) Although Buzzard himself – in Denis Healey’s phrase “a pale intellectual monomaniac”\(^6\) – was shunned by the defence establishment, graduated deterrence was to provide an important focus for the first scholarly discussions of nuclear strategy in Britain. Buzzard initially based his criticism of the six-week massive retaliation strategy on practical grounds. Intelligence suggested there could be no guarantee that Russia would collapse in such a short time given uncertainties over bombing accuracy, aircraft casualties and the morale effects of atomic weapons – specifically, the relative morale effects as between Russia and Britain, which, by engaging in such a strategy, would invite atomic attack on her own ports and cities. “If this gamble on quick results fails, the outlook for this country will subsequently be poor indeed.” Buzzard recommended instead concentrating on the forward defence of France and Scandinavia, delivering atomic weapons as necessary against military targets and using the first six to twelve months of war to mobilise western resources fully. He foresaw “in a few years’ time” that the Russians would have enough weapons of mass destruction to ensure that any strategy of reliance on an initial nuclear exchange “must ultimately become suicidal for this country.”\(^7\) McGRigor


7 PRO, Buzzard to McGRigor, DNI 8259 of 6 Jul 1953 in ADM 205/89.
was unreceptive to these arguments, although Buzzard elaborated them further both verbally and in writing: by 1960 the Russian nuclear stockpile would be such as to threaten the destruction of Britain in three weeks, and by 1965 "the initial period may well be reduced to six days, and there will then be no case for the Navy at all (or indeed any hope for the UK)."

Developments in nuclear weapons, meanwhile, were serving further to undermine the initial exchange/broken-backed warfare strategy, as tactical atomic weapons were developed in the US and accepted as part of the NATO arsenal by the North Atlantic Council in December 1954. In addition, as outlined in chapter two, the hydrogen bomb was becoming a reality. It was possible to envisage a situation of 'nuclear plenty' in the near future; indeed William Penney was able to suggest that Britain could achieve parity with the US and Russia by producing hundreds of H-bombs. In such conditions it is hardly surprising that the short war concept gained ground and that creative alternatives came to be sought by such as Buzzard. Philip Newell (Head of M) also suggested that arguments based on nuclear parity between East and West could not be "more than a year round the corner." It would be a mistake however to read too much into the beginnings of a nuclear strategic debate in 1953-54. Although there are hints of nuclear plenty and nuclear stalemate to come, and although some were beginning to see the implications, these were the first stirrings of ideas that only later had a serious impact. The endorsement of tactical nuclear weapons, for example, had more to do with existing strategic ideas about the forward defence of Western Europe, and the expense of doing this by meeting the 1952 Lisbon force goals, than with any idea that they offered a range of new strategic options. They signalled no rejection of the air-atomic massive retaliation strategy, rather a more efficient and probably a cheaper way to do things that would be done anyway in a global war as envisaged in the late forties: halt a Soviet advance and attempt to ensure Western European survival until the USSR collapsed under the weight of strategic bomber attack. Similarly, tactical nuclear weapons were absorbed in summer 1955 into the war plans of the Baghdad Pact in the Middle East as a way of holding a Soviet advance, perhaps by mining the mountain passes of the Zagros.

In 1954, a lone visionary in the pages of the Naval Review concluded that the H-bomb had ushered in an era of mutual deterrence. He reviewed the question of poison gas in the Second World War, suggesting that it remained unused because it made no military sense, not because of any moral scruple, and asking "to what extent a balance of holdings of atomic explosives may not tend towards a similar situation." He concluded that, as in Korea, local resistance to communism worldwide would be necessary and worthwhile, and that a Navy, especially its carriers, was therefore vital. Admiral Sir Patrick Brind, now retired, took the same

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8 PRO, Buzzard to McGrigor, DNI 8543 of 23 Jul 1953 in ADM 205/89.
9 PRO, COS(54)122nd mtg (CA) of 17 Nov 1954 in AVIA 65/1148.
10 PRO, brief of 23 Oct 1953 and manuscript note of 26 Oct 1953 in ADM 205/91.
11 See Navias, Nuclear Weapons and British Strategic Planning, pp.41-7.
view: "NATO must have enough forces to deter the Communists from resorting to military action short of that likely to provoke massive retaliation by the Allies."13 We have seen however that a different conclusion had been drawn at senior levels in the Admiralty after McGrigor's review of the implications of the hydrogen bomb. Although D of P noted that "stockpiles of nuclear weapons are increasing fast and we are approaching a state where the unrestricted use of available stocks would be universally fatal to mankind," and that in such conditions "war may then be outlawed by mutual consent," he also restated the dominant assumption that "it would be folly for the Allies to plan on any Soviet reluctance to wage nuclear warfare."14 During the late summer of 1955, as Clark and Wheeler note, suggestions of discontent in official circles about Britain's involvement in the nuclear deterrent business also began to surface. The hydrogen bomb led Churchill himself, introducing the 1955 Defence White Paper, to mention the possibility of mutual deterrence to the House of Commons.15 The Board of Admiralty however, despite Air Ministry fears, notably failed to join this chorus, also ignoring a submission from D of P that "we shall never be able to re-shape the armed Services of this country on a really sensible and economic basis within our financial limitations until the day comes when we can say that the hydrogen bomb has put an end to the chance of global war."16 Instead, to hark back again to chapter two, the official line remained for some years that broken-backed warfare capabilities should be preserved, and strenuous work continued through the Review of Naval Policy and its working parties to adapt the broken-backed war idea to a world with thermonuclear weapons.

Buzzard had meanwhile retired in 1954 and now devoted much of his time to the crusade against the massive retaliation strategy, as well as working for the arms manufacturer Vickers and a number of church bodies.17 The essence of the idea of graduated deterrence was to make the punishment fit the crime, devising tailored distinctions between tactical and strategic objectives, weapons and targets. Even in a 'hot' war, it was reasoned, the parties would have an interest in preventing an unlimited thermonuclear exchange; to admit this, and the danger of paying too high a price if deterrence failed, was sensible and realistic, and would increase the credibility of deterrence. The idea began, especially for Buzzard, to have a strong moral attraction; in addition it appealed to those who saw accurate strikes with conventional or tactical nuclear weapons as a means of capitalising on western technological superiority over the USSR. Finally, it also appealed to those like Liddell Hart who had been arguing, since before the war, for a return to

13 KCL, Brind Papers, 'The State and Role of the Navy after World War II' folder, typescript on 'The Role of the Navy' dated Jan 1955.
16 PRO, D of P to Mountbatten of 11 Jul 1955 in ADM 205/164.
17 The Buzzard Papers in Churchill College give an excellent insight into the early years of this crusade: see BZRD 24, 25, 26.
traditional military concepts of proportionality and the limitation of attacks to the enemy's military forces, and against indiscriminate strategic bombing. For Viscount Cunningham, now over seventy and in pain with arthritis, graduated deterrence was good news: "I am glad your scheme is being ventilated," he wrote to Buzzard, "it has the merit of being the only one on the market designed to mitigate an atom war" — although in America Bernard Brodie, and later William Kaufmann, had in fact already been working on similar ideas of discrimination in choices of weapons and tactics, and coercive rather than comprehensive nuclear attack.

Sir Reginald Aylmer Ranfurly Plunkett-Erle-Drax, easily the retired British admiral with the most splendid name of the postwar period, advocated a similar careful consideration of strategic targeting in the summer of 1954 in another *Naval Review* article, repeatedly describing indiscriminate strategic air attack as "murder bombing" — "when war starts our initial attacks must all be aimed, directly or indirectly, at the enemy's armed forces." Buzzard published an important article in the same journal the following year, which showed that his own thinking was developing away from his original practical objections to the June Directive. He extended Drax's argument into explicit advocacy of a 'no cities' strategy on ethical as well as military grounds, claiming that "there is much to be gained by making the attempt even if we fail," and that "both sides will be anxious - not reluctant - to overlook the occasional breach of the [no cities] rule." He also now advocated a public declaration of no first use of nuclear weapons against cities, an idea he was to develop further into a call for explicit signalling, in advance, of distinctions between targets and weapons to be used — perhaps his most important contribution to nuclear strategy.

Buzzard's work was, however, dismissed by the Chiefs when in December 1955 they considered a short paper on the subject from the JPS. On the grounds that limitations would be difficult to define and would restrict the freedom of action of military commanders, whilst tending to undermine in Soviet eyes our resolve to use the main deterrent force, the JPS suggested that no more than an "obvious" endorsement of the principle of economy of force was desirable. They further observed, patronisingly, that "Admiral Buzzard's personal thesis is subject to constant evolution and we have not attempted to follow the flights of the Buzzard subsequent to our discussions." The Vice Chiefs - VCNS being represented by ACNS, Rear Admiral Mike Goodenough - appear to have discussed the paper only briefly and it never reached the Chiefs themselves.

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20 Drax, 'Air Strategy in 1954' in *The Naval Review* Aug 1954, pp.276-80; see also correspondence between Drax and McGrigor in part 8C of ADM 205/102 (the First Sea Lord recommended caution in the use of the "murder bombing" tag). Drax had exercised a serious influence on naval policy since the 1930s.


22 PRO, JP(55)147(Final) of 13 Dec 1955 and COS(55)104th mtg of 15 Dec 1955 in DEFE 4/81; similar conclusions had already been expressed in COS(55)23rd mtg CA of 1 Apr 1955 in DEFE 7/2340. Goodenough had taken the trouble to attend an RIIA lecture on
Up to the end of 1955, then, new developments in nuclear weapons and nuclear strategic thought had made little impact in the UK, even specifically within the Royal Navy, which might have been expected to be receptive for example to the idea of limiting strategic bombing. No idea of the desirability of limiting nuclear war had gained much support; tactical nuclear weapons were accepted as useful, especially in Germany, but seem to have been viewed by the Army as just another weapon. The possibility of mutual deterrence had been raised, but in practice disregarded. As the Admiralty Permanent Secretary put it:

The more successful the Western nations [are] in building up a deterrent against the use of thermo-nuclear strategic weapons, the greater the importance that attaches to a war that might start and even continue for a long time to be waged on the basis of conventional weapons. On the other hand it is so completely beyond the capacity of this country to make plans based on two such divergent possibilities . . . that in practice we must endorse the general view that a future world war is likely to be thermo-nuclear from the start.23

The word ‘deterrent’ was becoming attached to the delivery system: V-bombers were the deterrent, ballistic missiles would replace them as the deterrent, SAGW would defend the deterrent. This terminological change underlies the implicit acceptance of a massive retaliation strategy involving such ‘big’ weapons systems. The Navy, as we saw towards the end of chapter two, was still principally concerned with preparing for post-nuclear operations.

Real drivers for change

During 1956 and 1957, a number of external factors emerged, or were reinforced, which were to have a considerable impact on this strategic consensus. Imperial policing had been relentless in its demands on British forces during the decade, with the Korean War officially continuing until 1954, the Mau-Mau revolt until 1955 and the Malayan Emergency until 1960. By far the most traumatic ‘post-imperial’ experience for Britain came however in November 1956 with the political failure, in the face of Russian and American pressure, of the Anglo-French action in Suez.24 This is hardly the place for a detailed account of even the naval aspects of the crisis' impact on strategic thought which was, very broadly speaking, twofold. Some saw it as evidence of American reluctance to support Britain and Europe against the USSR; they drew the conclusion that greater independence from the US, especially in the nuclear field, was important. Thus, although great efforts were immediately made to improve Anglo-American relations, successive Conservative governments were to become obsessed with the totem of an ‘independent’ British nuclear deterrent. Others saw Suez prefiguring a


24 For the Navy’s part in this action, see Grove, Vanguard to Trident, pp.184-97; Ziegler, Mountbatten, ch.41; for wider aspects, the recent Louis and Owen, eds., Suez: The Crisis and its Consequences, is very useful.
future of similar 'brushfire' operations, fought with limited means and objectives. They compared this with the ever more unrealistic prospect of global war and concluded that if the international system could survive the simultaneous shocks of Suez and Hungary then it might survive anything.

Suez also had the indirect result of bringing Duncan Sandys to office as Minister of Defence, with strict instructions and new powers from Prime Minister Harold Macmillan to conduct a thorough review of defence and to end conscription. Sandys tends to appear a rather two-dimensional figure in conventional accounts of the review. He was widely loathed by senior figures in the defence establishment, famously wrote his White Paper with little consultation and is often disparagingly referred to as Churchill's son-in-law, in a way calculated to imply the arriviste. He also brought to the job an unconcealed enthusiasm for guided missiles and a track record of opposition to the Navy's carriers. Again however, this is not the place for a detailed analysis of Sandys or his policies; their effects are the point at issue. The Sandys White Paper of April 1957 was the high-water mark of the air-atomic massive retaliation strategy in Britain - "the only existing safeguard against major aggression is the power to threaten retaliation with nuclear weapons" - and the final nail in the coffin of preparations for a 1950s-style broken-backed global war. In a phrase that echoed for a number of years, Sandys wrote that "the role of naval forces in total war is somewhat uncertain." Broadly speaking however, the major effect of such pronouncements, and of Sandys's uncompromising style, was to provoke several years of reaction against such views.

After Sandys came Sputnik, the USSR's first artificial satellite, launched in November 1957. Sputnik caused an unprecedented scare in the West about Soviet technological capabilities, a scare which the Soviet leadership was careful to foster. For the first time, for a wide public, it also signalled American vulnerability to Soviet missiles. American vulnerability meant, conceivably, American unwillingness to risk all in the defence of Europe, adding to the pressure for British independence. The launch of Sputnik also contributed, like no other single event before or after, to the feeling that stalemate had been reached in strategic nuclear weapons. It is worth noting as an aside, however, that American vulnerability had already been a worry in one specifically naval context for a number of years. As early as January 1954 the Admiralty's representative in Washington had warned of US fears of the deployment of Soviet missile submarines off the eastern seaboard, and the resultant risk that US anti-submarine forces could be withdrawn from a future Atlantic battle in order to concentrate on this new threat. At this stage the threat was more imagined than real - the Russians had barely taken the decision to develop submarine-launched missiles - but by May 1957 a distinct rift had appeared between the Royal Navy and the US Navy on this question. In subsequent years, efforts had to be made repeatedly in NATO circles to challenge the American view of this


26 Cmd 124 'Defence: Outline of Future Policy' April 1957.

27 PRO, C Hughes-Hallett to McGrigor of 7 Jan 1954 and DCNS comments thereon in part 8C of ADM 205/102.
threat, which “might lead them to divert unnecessarily anti-submarine vessels from their more vital role in the protection of shipping.”

Also during 1956 and 1957, the public nuclear debate in the UK became much more lively. Pierre, an interested outside observer, dates this phenomenon to the aftermath of the Sandys White Paper. Buzzard had already published several more articles in 1956 however, moving beyond a strictly naval audience and becoming part of a wider ‘commentators’ circle’ of defence intellectuals and politicians: Alistair Buchan, Richard Goold-Adams, Denis Healey, Michael Howard, Basil Liddell Hart, John Slessor and others. Semi-detached from this circle was the interesting figure of Patrick Blackett, who had fought at Jutland and enjoyed a successful career in Operational Research at the Admiralty during the war. He tended to disagree with Buzzard, dismissing arguments based on limited war distinctions and Western technical superiority and disbelieving in strategic nuclear war, indeed ultimately in any nuclear war. As early as 1948 he had challenged the prevailing orthodoxy that Britain should possess atomic weapons, although by 1956 he had concluded instead that a minimum deterrent posture was best – that nuclear weapons were necessary to frighten politicians, but still irrelevant to actual fighting. In America too, an academic debate about limited nuclear war gathered momentum in these years, Robert Osgood and Henry Kissinger adding new books to those of Brodie and Kaufmann.

Nuclear sufficiency

Suez, Sandys and Sputnik are commonplaces of postwar strategic history. It is clear however that the prospect of nuclear stalemate, and hence mutual deterrence between East and West, was receiving an increasing amount of attention in official circles in Britain some time before any of these influences were felt. I have already noted some of the first suggestions of such ideas in 1954-55; in the course of the

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28 PRO, JP(57)146(Final) of 22 Nov 1957 in DEFE 4/102; see also record of ISL’s weekly mtg 15 May 1957 in ADM 205/204; COS(57)35th mtg of 10 May 1957 in DEFE 4/97; JP(56)195(Final) of 1 Nov 1956 in DEFE 4/91; the American Project Nobska in 1956 regarded “defence against shore bombardment by submarines” as its basic problem (see KCL Archive, US Nuclear History, MFF16/00564 ‘Project Nobska’).


31 Blackett, Atomic Weapons and East-West Relations, p.32; see also Blackett’s collected writings in Studies of War, and Howard, ‘P M S Blackett’ in Baylis and Garnett, eds., Makers of Nuclear Strategy.

following two years they began to be expressed more often, and at more senior levels, especially in the Admiralty and the War Office. The name ‘nuclear sufficiency’ was coined for a state in which each side would possess sufficient nuclear weapons to destroy all of the targets it wished to attack in the event of war.

In June 1956, Controller and DCNS raised the possibility at a Board meeting of “circumstances in which a war of local origin would become global only in slow stages, and in which weapons of mass destruction would not be used at all, or only after hostilities on a global scale had lasted a long time. This possibility might become a probability when Russia achieved parity with the USA.”

The following week, Davis (VCNS) wrote to Mountbatten of the likelihood of “a global war for a long period with neither side daring to start the thermonuclear phase.” The First Sea Lord was moved, possibly as a result, to mention the idea to the other Chiefs at the end of the month in the context of discussions of NATO strategy:

> It is the Admiralty view that as the Soviet stockpile of thermo-nuclear weapons mounts . . . there will be an increased reluctance to use the deterrent. In these circumstances the assumptions that limited war in Europe or a war with Russia using only conventional weapons are both impossible, will become increasingly suspect.

Later Mountbatten expressed this opinion still more strongly: “We shall have to face the possibility of a war being fought with conventional forces (possibly with tactical nuclear weapons), because thermo-nuclear action by two power blocs, each with the maximum destruction in its possession, would mean world-suicide.” Not too much should be made of these statements – they usefully offered another justification for conventional naval forces during a defence review – but it is interesting that they were made at all, so long before Sputnik was launched.

Also in June 1956 – again before Sputnik, even before Suez – the question of ‘limited war’ was beginning to receive serious attention from the Chiefs. A JPS study discussed two possible wars in detail, against Egypt and China; nuclear weapons might be required for either, though only in the Chinese case was it felt that they would be absolutely necessary for success. The Chiefs appear to have been somewhat sensitive about these conclusions, and in approving the paper they were at pains to reserve any decision on nuclear use to the government of the day, therefore requiring from the JPS an additional study of conventional force requirements against these countries. We can be grateful that no further serious consideration was given to the use of nuclear weapons against Egypt in the remaining five months before the Suez operation. The questions of nuclear sufficiency and limited war continued however to receive fitful attention during

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33 PRO, Board minute 5021 of 21 Jun 1956 in ADM 167/144.
34 PRO, VCNS note of 26 Jun 1956 in ADM 205/163.
35 PRO, Mountbatten to CIGS and CAS of 19 Jun 1956 in AIR 8/2064.
36 PRO, Mountbatten to Boyle of 11 Jul 1956 in ibid. (and see other papers on this file).
37 PRO, JP(56)115(Final) of 26 Jun 1956 in DEFE 6/36.
38 PRO, JP(56)125(Final) of 18 Jun 1956 in ibid.
1957; the consensus appears to have been that war could remain limited only if Russia’s vital interests were unaffected and her forces not directly involved. Limited nuclear war was inconceivable without escalation to full-scale global war, except in the possible case of China. The Admiralty joined the War Office in reserving its position however at various points during these discussions.

It was clear by late 1957 that strategy could no longer be based on an initial atomic air offensive and a broken-backed aftermath, but positions at the top of the defence decision-making chain were becoming entrenched and the political and financial capital now involved in the big deterrent projects made it difficult for original or impartial thinking to make a significant impact. This was demonstrated for example by the experience of the Joint Global War Committee (JGWC), set up by the Chiefs early in 1956 to extend, on an inter-service basis, the work of the earlier Admiralty team on the likely nature, course and duration of a global war in 1970. The JGWC reported in 1957, but its findings, whilst they make fascinating reading today, were not especially useful to policy-makers at the time. A large number of war scenarios had been studied, with calculations of the relative success of air attacks on city targets under various assumptions. Key questions were however ignored. Nuclear sufficiency, indeed nuclear parity between East and West, was not so much assessed as assumed: “Both sides will do their utmost to maintain equality, rather than permit a potential enemy to gain a dangerous preponderance of strength.” Limited war was not addressed; the report discussed the initial strategic air phase of a global war between the USSR and the West. In doing so, it became heavily involved in technical questions on the relative merits of bombers, ballistic missiles and long-range guided bombs against various permutations of fighter and SAGW defences. Finally, the report was 113 pages long, and undermined by a one-page minority report from the Deputy Chief of the Air Staff disparaging its conclusions. Although therefore the JGWC’s report had been awaited with interest, at least in some quarters, it did not suggest a useful strategy for the changed conditions of the late 1950s. What, then, was to be made of impending nuclear sufficiency?

Duncan Sandys and the RAF drew the comfortable conclusion that the massive retaliation policy was working and should be given, if anything, increased emphasis. In particular, they drew the lesson from Suez and Sputnik that there was a need for a strong independent British nuclear deterrent, and for considerable investment in offensive and defensive systems to maintain its credibility. As a result, the RAF pursued the ballistic missile project Blue Streak, SAGW and ABM investigations, detailed targeting studies for the use of the V-bombers both with and without American support, and so forth.

See e.g., PRO, JP(57)151(Final) of 17 Jan 1958 [sic] ‘The Effect of Nuclear Sufficiency’ in DEFE 4/104; COS(57)70th mtg of 10 Sep 1957 in DEFE 4/100 discussing JIC and JPS papers on hostilities short of global war.

PRO, COS(57)237 of 21 Nov 1957 in DEFE 5/79; see also my article ‘A JIGSAW puzzle for Operational Researchers’ in Journal of Strategic Studies Jun 1997, pp.75-91.

Mountbatten, in particular, often referred to the work: see e.g., PRO, Board minute 5030 of 19 Jul 1956 in ADM 167/144; ISL’s weekly mtg 19 Jun 1957 in ADM 205/204.

Wynn, RAF Strategic Nuclear Deterrent Forces, ch.16, 23; on ABM research, see e.g., DRP/P(57)20 of 17 Jun 1957 and other papers in PRO, DEFE 10/276.
Naval responses

For the Navy, however, nuclear sufficiency suggested quite different conclusions. First, during 1957 and 1958, there was a visceral and at times fairly incoherent reaction to Sandys's words about the "somewhat uncertain" role of the Navy in global war. A large number of articles in the press and the defence journals asserted the historical importance of the Navy to Britain and the country's continued dependence on seaborne imports in the late twentieth century. Some writers wished good riddance to the broken-backed warfare idea, bemoaning a feeling of "impotence" in the face of nuclear weapons and the "little enthusiasm" engendered by existing naval strategy. Planning for the Fairlead conference at Greenwich in April and May 1957 had been underway for some time, but the event provided a useful opportunity, immediately after the White Paper, to advocate the idea of a Navy "universal and mobile for everything." The need for a 'balanced' Navy to ensure command of the seas in uncertain times again became a common theme in naval writings:

I say that the role of our navies in total war is crystal clear, and it is today, as it will be tomorrow, and as it has been throughout the ages, to keep the seas open for our ships, and to deny them to the enemy.45

Second, and in addition to these rather general assertions of the Navy's continued importance, there was renewed enthusiasm for specifically conventional naval warfare in extra-European theatres and indeed in Europe, either as an alternative, or perhaps as a prelude, to nuclear war. Both ideas relied upon the acceptance of the operation of mutual deterrence in conditions of nuclear sufficiency at the strategic level. Thus Mountbatten at Fairlead:

By then [1965?], Russia will have reached parity in nuclear weapons with the West. The effects of this, particularly on American public opinion, are bound to be considerable. It may be suggested that by then the concept of 'Nuclear Stalemate' may be so firmly embedded in our way of thought that the deterrents

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43 Blob, 'Thoughts on Morale' in The Naval Review Apr 1957, pp.191/5.

44 Hartley Library, Mountbatten's manuscript speaking notes for his opening address to the conference, in MB1/1143.

45 Adm Creasy, 'The Navy and the Future' in The Naval Review Oct 1957 (reprint of his address as NATO CINCCHAN to the Fairlead conference), p.382; Pierre correctly diagnosed the 'balanced fleet' message from the conference (Nuclear Politics, p.193); see also Arleigh Burke, 'The Oceans' in The Naval Review Jul 1957, pp.254-8 (reprint of an address to the English Speaking Union); PHD, 'The Composition of the Fleet' in ibid. Apr 1958, pp.177-83 and 'A Balanced Fleet for Britain' in ibid. Jul 1958, pp.280-91; E30, 'The Size and Shape' in ibid. Jan 1959, pp.40-5; Schofield, 'A Balanced Fleet' in Brassey's Annual 1958, pp.206-13. When the 1958 edition of the Naval War Manual was prepared, thinking was in some ferment and elements of the broken-backed warfare, offensive nuclear and 'balanced fleet' concepts are all present (BR.1806, e.g., ch. 6. 11. 13 and 20; preserved in PRO, ADM 234/590).
themselves may have begun to rust in our hands, and a new concept of conventional warfare may be arising. 46

In the late summer of 1957, attention was given in the Admiralty to the future role and composition of the Navy in what became known as the ‘Autumn Naval Rethink.’ A first-principles discussion paper was taken by the Board and later reached the Cabinet Defence Committee. In it, the Admiralty finally moved decisively away from the broken-backed warfare argument and towards a balance of forces for conventional war. Prevailing views on nuclear deterrence were reviewed, and the possibility of mutual deterrence raised; the Board decided that the argument was “sound” but would require careful presentation outside the Admiralty. The point was made meanwhile that “it is not . . . Admiralty policy to claim a share in the deterrent.” All major fleet components were listed with cold war, limited war and global war justifications.47 Not only did the Navy have a role, therefore, it had a number of roles: there were to be no more hostages to fortune like the single-purpose global war frigates and minesweepers of the early 1950s. All naval forces were multi-purpose, and if one purpose were unfashionable then the others would remain. This was not simply a matter of Whitehall tactics however: one is reminded of Royal Navy views of the NATO Striking Fleet, which also reflected a temperamental aversion, probably forged in the experience of the Second World War, to a single programmatic strategy and a preference instead for a ‘covering force’ capable of a number of roles. The First Lord, Selkirk, supported his service in attempting to advocate “a more all purpose role for the Royal Navy” against Sandys, who by this stage had conceded the need for a balanced fleet East of Suez but still wished to limit the Navy in home waters to a NATO anti-submarine role. The Chiefs were prepared to humour the admirals, conceding that both ideas had merit and that the truth appeared to lie somewhere in between.48 Mountbatten, in addition, took pains to cultivate Sandys personally in the months after the White Paper, his success being adjudged in a recent study one of his more notable achievements.49 As Ziegler puts it:

For the six months after the White Paper appeared Mountbatten’s task became the persuasion of Sandys that the Navy had a role . . . By September a paper had been prepared on the role of the Navy in cold war, limited war, as a deterrent, and in global war . . . Early in November Sandys visited Portsmouth, dined aboard the Victory and went on to spend the weekend at Broadlands . . . No other First Sea Lord would have had the style, the status or, for that matter, the country house to entertain the Minister of Defence and deal with him on equal terms. ‘We got on very well,’ Mountbatten told Patricia [his elder daughter]. 50

Hartley Library, Mountbatten to Pedder 12 Mar 1957 with suggested redraft for his own opening address in MB1/1143 (subject to consulting D of P on political sensitivity).

PRO, Board memo B1163 of 30 Aug 1957 in ADM 167/150 and minute 5155 of 4 Sep 1957 in ADM 167/149.

PRO, COS(57)263 of 4 Dec 1957 in DEFE 5/80.


Ziegler, Mountbatten, p.553.
During the latter part of 1957, therefore, the Admiralty had "put its own doctrinal house in order" and with a combination of style and substance had won greater support from Sandys than might have been thought possible earlier in the year. The scene was set for a much increased inter-service debate on the question of nuclear sufficiency during 1958, during which Mountbatten joined forces with increasing confidence with the Chief of the Imperial General Staff, Templer, to argue that conventional forces had grown in importance and deserved a larger share of the defence budget.

Templer served notice in February that he intended to challenge the JPS's conclusions on nuclear sufficiency, and Mountbatten joined him in suggesting a costed examination of the balance in spending between deterrent and conventional forces. The two appear to have been emboldened by a JIC assessment that there would be nuclear parity between East and West in around 1962. By July, Mountbatten was able to report to his weekly meeting that the Admiralty and War Office were now in "complete disagreement" with the Air Ministry on this question. Mackay, the Admiralty's civilian Under Secretary (Staff), prepared a position paper for the Board outlining a maximal interpretation of the naval view:

It is only a matter of time before the United States and Russia move into a state of nuclear parity or sufficiency. The JIC estimate that this will be achieved by about 1962. ... both sides will be in a position to inflict near-mortal damage on the other, irrespective of who strikes first. ... In this state it is hardly conceivable that either side will ever use the nuclear weapon. ... [Russia] will continue to back up even more effectively her successes in the cold war and to use more confidently and openly her forces in limited wars, without believing that her activity will provoke nuclear attack on her. If this is so, the West must look to her conventional defences.

Mackay went on to review the arguments for a UK contribution to the overall nuclear deterrent, tending to the view that this should be left to the US if the resources necessary were "such as to prejudice the size and equipment of the other forces necessary to implement a balanced defence policy." Dismissing the argument that the UK's meagre nuclear forces could in themselves affect Russia's willingness to act in a crisis, he offered two other possible justifications for a UK nuclear force:

52 See Navias, Nuclear Weapons and British Strategic Planning, pp.202-5; Clark, Nuclear Diplomacy, pp.115-20; Baylis, Ambiguity and Deterrence, pp.268-73.
53 PRO, COS(58)11th mtg of 4 Feb 1958 in DEFE 4/104; COS(58)19th mtg (CA) of 25 Feb 1958 in DEFE 4/105. The JIC's estimated date for the onset of nuclear sufficiency is variously reported as 1960-2 (Navias, p.202; Clark, p.117) or 1962-3 (Mountbatten in COS(58)19th); two different assessments may have been made, or a distinction may have been drawn between nuclear sufficiency and nuclear parity.
54 PRO, record of 1SL's weekly mtg 2 Jul 1958 in ADM 205/172.
(i) The UK nuclear bomb is the capsule of cyanide which John Bull keeps to crunch between his teeth just before he falls into the hands of savages, or
(ii) It is a sanction to ensure the involvement of America in total nuclear war and her destruction as well as our own. 56

Neither, he believed, was credible. Listing next the expensive projects then current for offensive nuclear weapons and their protection, including Mk.2 V-bombers, Thor, Blue Steel, Blue Streak, P.1 fighters, radars, AAGW and two generations of SAGW, he contrasted the small amount of money required to make the difference between ‘indifferent’ and ‘first-rate’ conventional forces. The paper was impressive in itself, and constituted the first strong naval objection to the hitherto largely unquestioned consensus on the requirement for a UK deterrent. Selkirk again loyally supported his service’s interests, writing in like vein to Sandys a week later.

As long ago as the previous July, the Admiralty had stated in the context of debates on the size of the V-bomber force that “the UK should make its contribution to the nuclear deterrent provided that this contribution did not cost so much . . . as to make it impossible to finance the other forces essential to ensure the cohesion of our Commonwealth, Dependencies and Alliances.” Now, V-bomber and nuclear weapons costings had been further developed, nuclear sufficiency was closer and by 1962 the deterrent would become “no longer a deterrent to war but a deterrent to nuclear war.” The current programme of expenditure on nuclear forces therefore needed a hard look lest it “quite irrationally dictate the scale and equipment of the conventional forces.” 57

High-level disagreement on the subject became increasingly bitter, and Mountbatten periodically reported back to the Sea Lords on the impasse that had been reached. 58 At a visceral level, many naval officers now believed nuclear weapons to be “a political gimmick and not proper military weapons.” 59 Clark is right to note however that the Navy’s growing interest in Polaris, which will be discussed in chapter five, was now leading to a certain amount of caution in pursuing the nuclear sufficiency argument to its logical conclusion: the First Sea Lord, ever the Machiavellian, now suggested that “it would cloud the issue to introduce Polaris into the present Nuclear Sufficiency discussions.” 60 He nevertheless forwarded a paper to Sandys, signed jointly with Templer, attacking openly the concept of a fully independent UK deterrent and urging a review of strategic priorities together with a fuller account of costings. It is clear that the reaction against the economic and strategic underpinnings of the 1957 White Paper was now in full swing. 61 In June 1959, Mackay once again produced a paper for the Board, explaining that:

56 ibid.
57 PRO, Selkirk to Sandys of 17 Jul 1958 in AIR 2/13693.
58 See e.g., PRO, record of 1SL’s weekly mtgs 11 and 17 Sep 1958, 1SL’s bulletin of 29 Sep 1958, all in ADM 205/172; Board minute 5261 of 2 Oct 1958 in ADM 167/151.
60 PRO, 1SL’s weekly mtg 17 Sep 1958 in ADM 205/172: Clark, Nuclear Diplomacy, p.120.
61 PRO, 1SL/CIGS paper attached to Board memo 1231 of 23 Sep 1958 in ADM 167/152.
The rapidly developing situation where a state of nuclear sufficiency between the West and the East is likely to be reached in the near future with the increased possibility of limited wars . . . [implies an] imperative need to be able to deter and fight such wars with first rate conventional forces. Twelve months ago this was a minority view: today it has a great deal of support in all quarters.62

In 1958 the attempt to reverse strategic priorities between the deterrent and limited war had failed, and the tactic had “no more chance of being found acceptable than it had last year.” Instead, Mackay advised caution for the time being, leaving the deterrent in the hands of the V-bombers, abandoning Blue Streak and waiting for Polaris to prove its worth before considering its procurement. Lambe, now First Sea Lord, wished to go further:

He thought it was clear that the maintenance of conventional forces would be prejudiced if this country continued to contribute to the deterrent in accordance with present plans. If the Board accepted this view should we come out into the open at once and say that the Admiralty could no longer support an independent United Kingdom contribution to the deterrent, or should we play for time as outlined in the paper?63

Again however there was no decision to oppose the deterrent outright: instead the Board rebelled against the wilder financial excesses of the deterrent programme and confined its opposition specifically to Blue Streak, deciding that “they could no longer support an independent United Kingdom contribution to the deterrent in the form of a ballistic missile.”64 This decision still sat uneasily with a growing body of opinion supporting Polaris, and in effect had to be abandoned in September, the Board agreeing not to present such an opinion to the British Nuclear Deterrent Study Group (BNDSG) investigating delivery system options.65

More work on limited war

Mackay was right, nevertheless, to claim that the nuclear sufficiency argument was gaining ground. A number of studies for the Chiefs in late 1959 and 1960 showed the growing importance to defence policy-makers of limited war. British force deployments were changing in line with the new East of Suez policy; and the collapse of Blue Streak and other expensive projects associated with the deterrent drove the government towards accepting more of a minimum posture. There are several published accounts of defence policy-making in this period, and the story of the technical evolution of the big delivery systems and the public and political

63 PRO, Board minute 5328 of 25 Jun 1959 in ADM 167/155.
64 ibid.
65 PRO, Board memo B1268A of 3 Sep 1959 ‘Implications of Polaris submarines’ in ADM 167/153.
debates surrounding their adoption is well known. Some lesser known aspects of the story will nevertheless be of interest.

The JGWC had by 1959 recovered from its setback of two years previously, and its work had been focussed rather more effectively on problems of specific interest to UK policy-makers. From October 1958 it also enjoyed the support of a full-time study group. More complex questions than the various initial exchanges in the 1957 report were now discussed, and in late 1959 three reports of concrete importance to the ongoing policy debates over delivery systems were produced for the Chiefs. Soon afterwards, Captain C P Coke, the naval representative on the study group JIGSAW, was working on mutual deterrence, nuclear sufficiency, the possibility of limited war between East and West, the use of tactical nuclear weapons in limited war and means of preventing its escalation. This work gained momentum during 1960, and was well known to Mountbatten, now Chief of the Defence Staff, and to the new Chief Scientific Adviser Sir Solly Zuckerman. By May the informal conclusions of the work were being circulated, although the JIGSAW group was conscious of their controversial nature. A state of mutual deterrence would be reached, it was thought, by 1965, and since the USSR would no doubt continue with its cold war diplomatic adventures and limited military action – it had, after all, lived with the threat of overwhelming atomic attack for a number of years – the US would be “compelled to recognise that she will no longer be able to protect her allies by threatening the use of her strategic nuclear forces.” JIGSAW became concerned to explore the detailed implications of the ‘decoupling’ many supporters of the independent deterrent had feared, and later to consider the possible role of conventional forces in global war and the chances of local limited nuclear wars being fought under ‘Queensberry rules’ in an age of mutual deterrence. Of themselves, the deliberations of this working-level group were not especially significant; indeed, such opinions had been expressed a number of times previously. Their importance now lay however in their association with the figure of Zuckerman, who with the increasing support of Mountbatten was to embark on a crusade against the notion that nuclear weapons were a rational means of fighting a war. The JIGSAW studies came therefore in the latter part of 1960 to arouse some controversy. One paper in particular, on the implications of mutual deterrence, had

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66 See e.g., Clark, Nuclear Diplomacy, ch.5, 7; Baylis, Ambiguity and Deterrence, ch.9; Pierre, Nuclear Politics, ch.8; Wynn, RAF Strategic Nuclear Deterrent Forces, ch.21-4; on technical aspects of Blue Streak see Morton, Fire Across the Desert, pp.435ff.

67 PRO, COS(JIGSAW)(60)2nd mtg of 8 Jan 1960 in DEFE 10/390. Interestingly, Capt Coke’s previous posting had been as CO of HMS Victorious, the Navy’s first nuclear-capable aircraft carrier (see below).

68 See e.g., PRO, 1SL’s weekly mtg 26 Mar 1958 and other papers in ADM 205/172; COS(58)43rd mtg of 16 May 1958 in DEFE 4/107; note by Mountbatten of 9 Mar 1960 in DEFE 19/15.

69 PRO, Zuckerman to Mountbatten, 24 May 1960 covering JIGSAW progress report ‘Some Implications of Mutual Deterrence’ in DEFE 7/2236; COS(JIGSAW)(60)27th mtg of 1 Jun 1960 in DEFE 10/390.
to be withdrawn in November, and some resentment is evident as a result. The paper must have discussed the possibility of a conventional war in Europe.

While the JGWC and JIGSAW were considering the implications of mutual deterrence for nuclear strategy, the JPS had been tasked with a comprehensive study of UK force requirements for limited war. The question arose originally because of War Office anxiety to build ammunition stockpiling requirements into its 1960 estimates; later, when this question had been dealt with, Lambe was instrumental in kick-starting a wider inter-service study. Sir Norman Brook, not for the first time in his fifteen-year career as Cabinet Secretary, was chairing a defence review committee which had also evidently concluded that work was needed on the background to limited war, likely UK strategy, the roles of the three services, the possible use of nuclear weapons and force and logistic requirements.

The JPS completed its initial report in March; after various revisions it was finally issued as a paper by the Chiefs in June and passed to the Minister of Defence in July, with spin-off studies continuing thereafter until the Cabinet Defence Committee met at Chequers in October to resolve the remaining differences.

The study covered military strategy for hostilities short of global war; the setting was extra-European. The possibility of limited war in Europe, perhaps at sea, was considered and rejected:

It can be argued that there is a possibility of a limited war confined to the sea with Russia using her vast submarine fleet as an instrument of war by itself to force her policies on the West. We consider that throughout the next decade the dangers of rapid escalation to global war would be so great that the possibility is too remote to justify further consideration.

The annexe to this study on the use of nuclear weapons is interesting, echoing the conclusions of work in 1956-57 that the possibility of using nuclear weapons in limited war was realistic only in the specific context of war against China.

Views on the need for nuclear weapons and their possible uses are widely divergent. Further, the complete lack of any precedent for their tactical employment ... and the vast number of associated political, psychological and ethical factors make it difficult to formulate even a strictly military policy.

70 PRO, COS(JIGSAW)(60)64th mtg of 18 Nov 1960 and 65th mtg of 25 Nov 1960; COS(JIGSAW)(61)4th mtg of 24 Jan 1961, all in DEFE 10/390. I have not found a copy of the offending paper, COS(JGW)(60)9.


72 PRO, COS(60)20 of 27 Jan 1960 in DEFE 7/2231.

73 See papers in PRO, DEFE 4/127, DEFE 7/2231 and 2232, ADM 1/27810.

74 PRO, JP(60)16(Final) Intro and Part I of 30 Mar 1960 in DEFE 7/2231.

75 PRO, JP(60)16(Final) App B (Revised) of 28 Jun 1960 'A Study on Nuclear Weapons' in ibid.
The possibility that tactical nuclear weapons could be used at sea, for example against Chinese submarines, was certainly considered alongside other options, up to and including a comprehensive strategic attack. An independent UK nuclear capability based on Royal Navy and RAF aircraft was recommended for the Far East, at least partly “in order to be able to influence US policy . . . there is a clear possibility of divergent views between the United States and the United Kingdom. And it is in this theatre that these divergences may be most pronounced and potentially dangerous.” It should be remembered that in 1960 China still did not possess nuclear weapons of her own, although the study pointed out that this would change probably towards the end of the decade. In the Middle East, however, no use of nuclear weapons could be contemplated without the risk of swift escalation to an all-out nuclear exchange. The Chiefs concluded that “for conditions short of global war, only those forces which may be deployed in the Far East should be equipped with nuclear weapons.” These would include two Royal Navy carriers.

Red Beard in the Far East

It is worthwhile digressing at this point to consider the entry into service of the Royal Navy’s Red Beard tactical nuclear bombs. As I have argued in chapter three, naval Red Beard was originally intended as a counter to Soviet surface raiders in the North Atlantic; by the time it entered service ten years later, however, it had a very different strategic rationale – one which Charles Lambe, for one, rather disliked. In this section I shall engage in a little detective work, suggest an exact date for Red Beard service entry, and consider the role of the weapon.

The earliest OR set a target date of 1957 for Red Beard; publicly available estimates of the eventual date range from Simpson’s 1958 to Norris, Burrows and Fieldhouse’s 1962. The truth is rather difficult to establish with any certainty. During 1958, various discussions at senior and working levels suggested that the first naval Red Beards were now expected in January 1959: three weapons had been allocated to the Navy from the first production run and in March 1958 the Air Ministry was considering a request to store them. In July, correspondence at ministerial level began, confirming again that the three bombs were expected and requesting guidance on their carriage aboard HMS Victorious, now identified as the first carrier to be fitted. Various minutiae were discussed: the weapons were to be stored in two pieces, widely separated aboard ship and only married up if operationally necessary in wartime. The Admiralty was nevertheless anxious to obtain permission for storage in peacetime, since the logistics of getting nuclear weapons to sea in a crisis at short notice – not to mention the political signals such a
move would send – were unlikely to be acceptable. Various suggestions for publicising the Navy's new capability were also considered, and rejected, although the Commanding Officer of Victorious, Captain C P Coke, was authorised in November to inform his crew that the ship had been "fitted to carry nuclear weapons." No Red Beards were actually embarked at this stage, however; Red Beard was still, in January 1959, expected "this month" and only in February did the Admiralty signal Victorious with security instructions on embarking and disembarking nuclear materials.83

This was not, however, the end of the story. The RAF is not thought to have received all of the Red Beards it expected from its own allocation in 1958/9; neither, perhaps, did the Navy.84 Discussions on clearance to carry Red Beard aboard naval aircraft and on targeting did not take place until later. There was a flurry of correspondence on inspection arrangements for naval nuclear weapons in August 1960.85 The first record of Controller Air Release or 'CA Release' for Red Beard on Scimitar aircraft – an equivalent of the civilian airworthiness certificate – also dates from August 1960, although for some time to come the instructions for carrying the weapon were hedged about with restrictions because of the safety problems mentioned in chapter three. Aircraft were not permitted to make arrested landings on board a carrier with Red Beard in any circumstances, and could only take off with the live weapon in an extreme operational emergency.86 By June 1961 this restricted clearance had been passed to HMS Victorious, Hermes and Centaur, by April 1962 clearance for the 'Mk.2' warhead, a somewhat safer version, had been issued to Victorious, Hermes, Ark Royal and Eagle. Only in December 1963 was a final clearance issued to all five Royal Navy carriers, extending to Sea Vixen as well as Scimitar aircraft but still limiting permission to carry the live weapon to "conditions of emergency," and still excluding any arrested landing.87

Victorious was the first British carrier to operate the Scimitar aircraft; the documentary evidence suggests that she was also the first to embark nuclear weapons. She docked briefly at Portsmouth during January and February 1959, and again for a refit between February and August 1960.88 It seems likely that she embarked her nuclear weapons on one of these occasions, but did not have clearance to assemble and use them, even theoretically in an emergency, until

81 PRO, draft record of mtg 4 Sep 1958; H of M to Gough (MoD) 10 Sep 1958 in ibid.
82 PRO, Admiralty signal to CO Victorious 051800Z Nov 58 in ibid.
83 PRO, draft of D(59)2 of 22 Jan 1959; Admiralty signal to C-in-C, Flag Officers, COs Excellent, Victorious, Collingwood, Ariel and RNAS Lossiemouth 181301Z Feb 59, both in ibid. (Excellent, Collingwood and Ariel were shore establishments and not ships).
84 PRO, Myers (MoS) to Humphries (Air Min) of 22 Apr 1959 in AVIA 65/1166.
85 PRO, papers in AVIA 65/1063, esp. enc.44.
86 See Admiralty circular of 6 Feb 1961 to FOAH, FOAC and HMS Hermes ref. Scimitar F.1 CA Release dated 8 Aug 1960, in PRO, ADM 1/27827.
87 PRO, various papers in ADM 1/27827.
August 1960. It is possible, alternatively, that even though *Victorious* was the ship that had been making preparations it was either *Hermes* or *Ark Royal* which actually received the first Red Beards. *Hermes* spent much of the time between November 1959 and May 1960 at Portsmouth before sailing to the Mediterranean and embarking her first Scimitars in July. The *Ark* recommissioned at Devonport in December 1959 before embarking her Scimitars in March 1960; she then exercised with *Hermes* and various US carriers, first in the Mediterranean in August and then in the North Atlantic in the autumn; *Victorious* joined the other two carriers for further exercising with the US Sixth Fleet in the Mediterranean in November 1960. *Centaur* probably received Red Beard early in 1961 with her first squadron of Scimitars; she disembarked her Scimitars in 1963, but may have continued to carry nuclear weapons to equip her Sea Vixens. The first Buccaneer squadron was commissioned aboard *Victorious*, also in 1963, and will probably have had a Red Beard capability from the outset. *HMS Eagle*, the last of the then five Royal Navy carriers, only recommissioned after an extended refit in 1964. 89

The point of this rather detailed digression into the operational lives of the Navy’s carriers and carrier aircraft is not to establish, particularly, that this or that ship was first – still less to compromise the long held ‘neither confirm nor deny’ policy on the presence or otherwise of nuclear weapons aboard ship. It is rather to establish the context for Red Beard’s entry into service. Initially, it is likely that the first Red Beards were carried in European waters; very soon, however, they are likely to have been taken to the Far East. SACLANT wrote to the Admiralty in September 1959 asking about the Royal Navy’s nascent nuclear weapons capability and doubtless inviting discussion of arrangements for targeting as part of the NATO Striking Fleet. 90 The Striking Fleet was losing importance however in Royal Navy exercising as the years went by. Exercise Strikeback in 1957 had been somewhat unsuccessful. The US Navy’s first SSN, *Nautilus*, had been able to operate with impunity under the carriers and the RAF’s Valiants had made successful attacks on the fleet with simulated nuclear weapons. 91 *Victorious* took part in exercise Blue Frost in 1959, and *Ark Royal* and *Hermes* took part in a major exercise Sword Thrust in autumn 1960 in the North Atlantic, but by 1964 the Teamwork series of exercises had begun, marking a shift in focus in NATO exercising towards the reinforcement of Norway and away from strike operations. The lives of the Royal Navy’s carriers now revolved instead around Singapore; *Victorious* and *Hermes* began the first deployments under the East of Suez policy at the end of 1960, and by


90 PRO, Lee (MoD) to CDS of 2 Dec 1960 in DEFE 7/2090. *Victorious* was at this stage heading – after exercises with the US Navy off Norfolk, Virginia – towards Norway for a further exercise, Blue Frost. It seems likely that her nuclear capability had been advertised in some way to SACLANT, and that this provoked the interest.

91 PRO, note to VCAS of 24 Oct 1957 in AIR 20/10306.
1961 there were more Royal Navy ships operational East than West of Suez.\textsuperscript{92} Naval Red Beard, on entry into service, became by default a part of the limited war capability against China discussed by the JPS and Chiefs during 1960, rather than primarily a part of the Striking Fleet.

There is some evidence to suggest that First Sea Lord Charles Lambe was unhappy with this state of affairs. He wrote in September 1959 of his dismay at the Navy's carrier aircraft and their unsuitability for the limited war requirements now placed upon them, which he listed as:

(a) Army support, (b) Fighter defence of a task force or amphibious force against cast-off Soviet aircraft flown by WOGS \textit{sic}, (c) Limited Strike against shore targets using non-nuclear weapons, (d) Ancillary tasks such as photographic reconnaissance etc.

He was prepared to concede that a nuclear capability could be useful against Russian 'volunteers,' to deter escalation and in carriers allocated to NATO in war – "at least so long as the Strike Fleet concept remains alive" – but thought simpler aircraft and weapons would be more appropriate in limited wars if Britain was not to be "up [an] extremely expensive gum tree" in future.\textsuperscript{93} At a Chiefs meeting in 1960, he "wondered whether it was necessary for Carriers to have the means of delivering atomic weapons in limited war . . . this task could be performed by the V-bomber force." At least one contributor to the \textit{Naval Review} agreed with him, questioning the role of carriers in global war – "one presumes they would form part of the NATO strike fleet, but striking what and where?" – as well as their suitability for limited war – "it is also questionable whether one requires very high-performance, sophisticated strike aircraft for 'nigger-bashing'."\textsuperscript{94} These concerns notwithstanding, it is fair to say that the majority of naval officers were well pleased with the new East of Suez role which emerged from the wreckage of global war in the late 1950s. Certainly Lambe's own commitment to imperial policing was greater than his belief in the possibility of war in Europe: "I'm sure this is the crux of 'defence' for the next ten years, \textit{not} V-bombers, \textit{Victorious}es or nuclear missile firing submarines."\textsuperscript{95}

NATO strategy in an age of mutual deterrence

Thus far I have attempted to trace the impact of ideas of nuclear sufficiency and mutual deterrence chiefly on UK strategy outside Europe. Within the NATO area, however, there was still work to be done. NATO strategy changes only slowly; this

\textsuperscript{92} Reactor, 'Where is the Royal Navy?' in \textit{Navy} Feb 1961, p.29.

\textsuperscript{93} PRO, 1SL to VCNS and DCNS of 18 Sep 1959 in ADM 205/214. Lambe's comments are equally relevant to a suggestion made earlier in the year that nuclear weapons could be used aboard commando carriers for use in shore support for the Royal Marines, which seems not to have been repeated (Board memo B1274 of 22 Jun 1959 in ADM 167/153).

\textsuperscript{94} PRO, COS(60)1st mtg of 5 Jan 1960 in DEFE 4/124; Full-Due, 'Wanted! – A Sane Defence Policy' in \textit{The Naval Review} Apr 1961, pp.97-101.

\textsuperscript{95} Quoted as C-in-C Med in the late 1950s in Warner, \textit{Admiral of the Fleet}, p.194.
Chapter 4: Nuclear Stalemate

is inevitable in a large alliance in which any questioning of military thinking has political implications and must be approached cautiously. Thus at the end of the 1950s, whilst the UK’s strategic consensus had moved on, NATO remained committed on paper to what by now appeared to be a distinctly old-fashioned concept of an initial air-atomic offensive followed by a broken-backed phase of less intense operations, especially at sea. This concept can be traced throughout the 1950s in the annual Emergency Defence Plans (EDPs) issued by SACEUR and SACLANT and reviewed by the NATO nations.

During the 1950s, there had been a number of debates over the fine details of these plans. As I have noted, for example, there was concern in the UK over the threat the US Navy perceived to the cities of the eastern seaboard from Soviet missile submarines. By the end of 1959, the Royal Navy had reluctantly to accept the futility of protesting at the diversion of resources from the eastern to the western Atlantic to deal with this threat. Mountbatten and Arleigh Burke meanwhile engaged in a lively correspondence during the late 1950s on a wide range of naval subjects. Familiar lines of disagreement were revealed in discussion of the findings of the 1956-57 Atlantic War Working Party, with the Royal Navy stressing the importance of convoy and Burke countering that this played down attack at source and anti-submarine transit offensives. Mountbatten forwarded the results of another investigation at Woolwich the following year, in which ‘sanitised lane’ and transit offensive strategies were shown to be a poor substitute for large defended convoys in ABCD spacing. Newer weapons including SAGW, NDBs and ASROC had been taken into account. He also sent copies of an article by Gretton from the Naval Review in which the Naval Staff History’s findings on the U-boat war had been summarised: sixty-five percent of U-boats had been sunk around convoys, twenty-seven percent in transit and eight percent elsewhere. Burke’s stout rejoinder, to the effect that anti-SSBN operations could hardly rely upon convoy, did not diminish Mountbatten’s enthusiasm for Gretton’s article, and there is some evidence that US thinking was shifted as a result. These anti-submarine warfare studies had an increasing air of unreality as time wore on however. The 1957 Woolwich study had assumed a campaign in 1967 in which “the main nuclear offensive on both sides has been halted by losses and there is, as yet, no evidence of

96 See e.g., Lambe’s comments on SACLANT EDP for 1960 in PRO, COS(59)74th mtg of 1 Dec 1959 in DEFE 4/123.

97 PRO, Mountbatten to Burke of 22 Jan 1957 and Burke to Mountbatten of 11 Jul 1957 in ADM 205/204.

98 PRO, Mountbatten to Burke of 14 Jan 1958 in ADM 205/179.


100 See record of ISL’s weekly mtg 23 Apr 1958 in PRO, ADM 205/172; James Tritten, an American admiral, recalls that the Staff History “settled the matter” (Tritten and Dandolo, A Doctrine Reader, p.29). and by February 1959 Mountbatten was extremely satisfied with a new atmosphere of agreement in ASW policy (Hartley Library, Mountbatten to Burke of 25 Feb 1959 in MB1/I447).
capitulation on either side," but as we have seen the broken-backed warfare idea was already seen to be an inadequate justification for a global war Royal Navy.

A revision of NATO strategy for a nuclear war at sea was overdue. Changes in nuclear targeting doctrine were also now taking place. Strategic Air Command, SACEUR and SACLANT introduced a greater measure of coordination in their planning from around 1959, working towards a Single Integrated Operational Plan. Bomber Command remained interested in a counterforce strategy, but national as opposed to NATO targeting plans were focusing on an ever smaller number of city targets. During the early 1960s, it seems that a ‘Joint National Retaliatory Strike Plan’ was devised in the UK, which would not have been joint if it had not involved the Navy.

Late in 1959 the JPS, reviewing SACLANT’s EDP for 1960, highlighted its overemphasis on ‘phase two’ of a global war. By the summer of the following year, a full-scale Chiefs review was underway of NATO planning assumptions. It was clear that although an all-out nuclear effort at the start of a war was still envisaged, the large numbers of nuclear weapons now available to both East and West meant that “the outcome of whatever operations might be possible after an all out strategic nuclear exchange [would be] irrelevant to all that NATO seeks to preserve.” This conclusion would apply at sea as on land. A working party under F W Mottershead, a senior MoD civilian, was set up to review British attitudes towards NATO nuclear weapons policy, initially limiting its work to the question of NATO MRBM proposals, but later more generally attempting to understand the implications for NATO of what was now delicately referred to as ‘nuclear equipoise’ and to look for ‘third ways’ between collapse and immediate all-out nuclear response, not necessarily excluding tactical nuclear weapons. The question was to provide work for academics, military officers and officials in all the NATO countries for the following thirty years.

In October 1961, and already with one eye on the uncertain long-term future of the East of Suez role, First Sea Lord Caspar John directed VCNS Varyl Begg to produce a study of NATO maritime strategy and the UK’s contribution thereto. Begg quickly concluded that naval forces should be strong enough in any struggle

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101 PRO, scenario under cover of DCNS to Sec/1SL of 29 May 1957 in ADM 205/204.
103 Clark, Nuclear Diplomacy, pp.382-94; Baylis, Ambiguity and Deterrence, pp.288-90, 307-12.
104 The significance of this plan is uncertain; it may simply have codified existing plans. The relevant file, ADM 1/28074, is still classified, but the PRO class list shows that it contains papers dating from 1962-65.
106 See papers in PRO, DEFE 13/425, 426 and 427.
with Russia to “maintain the credibility of the deterrent by reserving it to the
moment of despair.”

By May, he had discussed his conclusions with the First Sea
Lord and was proposing “a radical alteration to the current official NATO concept
of a ‘broken back’ war”:

It is . . . imperative to underpin the nuclear deterrent with such conventional
forces as will deter conventional aggression, or failing this, will identify and
counter it . . . NATO’s maritime strategy has not hitherto addressed itself to this
central problem of the shield forces concept. Current NATO maritime strategy is
based mainly on . . . SACLANT’s Emergency Defence Plan as follows:-
‘Should war occur, it will most probably consist of two phases:-
- a relatively short initial phase of intensive nuclear attack;
- a subsequent phase involving operations of indeterminate length and of lesser
intensity.’

We believe that a strategy based on these assumptions will be in some ways
wrong and in others incomplete. We contend that:-
(a) The concept of broken back warfare is invalid: the strategic nuclear exchange
will be ‘short, devastating and decisive.’
(b) Maritime strategic planning should therefore be concerned above all not with
the period after the exchange but with:-
(i) deterring aggression at any level,
(ii) if aggression nevertheless occurs, preventing it from achieving a
stranglehold,
(iii) and yet also preventing it escalating into nuclear war.

Correspondence on the subject continued throughout 1962, with the general tone
both in Royal Navy and US Navy circles approving; certainly there seems to have
been a feeling that this was a good time to suggest a revision of NATO maritime
strategy and to advocate maritime ‘shield forces’ to match those on land on the
central front. By the summer, the idea had been suggested separately in the MoD.
A paper was put to the Chiefs in November, using many of Begg’s words. With the
assumption that “the strategic nuclear forces may well deter each other indefinitely”
came important new roles for naval forces: as a convincing military presence in
European waters in peacetime, as a counter to various harassing actions – “this has
been forcefully demonstrated by the recent events in Cuba” – and as an important
and useful capability should deterrence fail:

NATO requires maritime shield forces whose tasks in order of priority should be:
(i) to deter and
(ii) if necessary to frustrate aggression at levels which would not justify the use
of the nuclear deterrent,
(iii) to combat enemy missile submarines in the event of a nuclear exchange,
(iv) as an operational force in being to assist in survival after the nuclear
exchange.

After a further revision and the addition of an annexe listing possible harassing
actions, ranging from the detention of merchant ships in harbour to interference

107 PRO, VCNS paper of 13 Feb 1962 in ADM 205/188.


with submarine cables and the closure of fishing grounds or other waters, the paper was agreed and passed to the Minister of Defence for use in NATO discussions.\footnote{110} By December the Board was told that "the idea of broken-backed war which was so influential in all NATO thinking ten years ago has ceased to be credible."\footnote{111} The ideas were to become somewhat bogged down in NATO circles, just as efforts to introduce 'flexible response' on land had been, although Arleigh Burke had begun similar work in the US. Such work eventually contributed to the framing of the NATO flexible response doctrine at sea from 1968; some comments on this process will be included in the next chapter.

The Royal Navy's lack of enthusiasm for nuclear operations at the outset of war was thus widely echoed and reinforced by the early 1960s. It is interesting that the net effect was to replace one rationale for a conventional anti-submarine campaign in the North Atlantic - broken-backed warfare - with another. Nuclear weapons continued to be marginalised, and although from time to time it was now suggested that NDBs, in particular, had an important part to play in a future Atlantic battle, opinion remained divided and very wary of the risks of escalation this involved. There is no trace of enthusiasm in naval writings, public or official, for the idea of the North Atlantic as a 'western desert' in which nuclear weapons could be used freely by East and West without collateral damage or escalation. We have seen that the 1960 studies of limited war explicitly rejected this possibility, although conceding that nuclear anti-submarine weapons could have a part to play in a war with China. Throughout the debates on NATO maritime strategy in 1961-63, the possibility of nuclear war at sea continued to be rejected because of the risk of escalation.\footnote{112} The Admiralty had also yet to commit itself to the requirement for an NDB.

Outside official circles, views on nuclear war at sea were no more enthusiastic. The official historian Stephen Roskill, in a book which distilled his observations on maritime warfare, barely mentioned nuclear weapons: "The conclusion is inescapable that in the era of nuclear parity, in a period of 'cold war' or in a conflict for limited purposes, a strategy based mainly on nuclear power cannot be effective."\footnote{113} Gretton considered the possibility of a Russian limited war against western sea communications in a 1964 article, postulating a series of harassing actions culminating in "an undeclared war of some duration being carried on between the escorts of NATO convoys and the attacking communist submarines." He suggested that "it is even possible, though this is more difficult, to consider the use of tactical nuclear weapons in a war at sea without causing escalation to general war. Weapons used under water against submarines, for instance, would not harm non-combatants and might be considered acceptable, although air-launched nuclear weapons against merchant ships might be judged
differently."\(^{114}\) A year later, whilst again conceding this possibility in his book *Maritime Strategy*, Gretton concluded that "because of the doubts about escalation, both sides would clearly try to avoid using nuclear weapons tactically."\(^{115}\) These books, and another by Laurence Martin two years later, provided a valuable and scholarly rationale for maritime forces in an age of mutual deterrence. As Martin put it, "seapower must henceforth be exercised within a framework of nuclear deterrence and the limitations that this imposes upon the weapons that may be employed in any particular situation." He too was sceptical about the idea of limited war at sea: "The limitation of war in the nuclear age is imposed by the necessity to avoid the general use of nuclear weapons. This requires abstention from efforts to achieve military or political purposes that go beyond the bounds of a nuclear opponent's tolerance. A full-scale Soviet effort to interdict trans-Atlantic commerce would seem to fall beyond these bounds." Tactical nuclear weapons were unlikely to be used at sea "until the nuclear threshold has been crossed for weightier, strategic purposes."\(^{116}\) Naval strategists in Britain had once again managed to reposition themselves, describing a range of flexible and desirable maritime roles and forces for the future *without* having to subscribe enthusiastically to the use of nuclear weapons.

\(^{114}\) Gretton, 'Threat to Sea Communications as a Method of Limited War' in *Brassey's Annual* 1964, esp. pp.27-8.

\(^{115}\) Gretton, *Maritime Strategy*, p.92. Gretton, DCNS as recently as 1963, was not giving an 'official' view but nevertheless spoke with some authority.

\(^{116}\) Martin, *The Sea in Modern Strategy*, pp.14, 44, 89. Martin, an academic, wrote a less obviously authoritative book, but had nevertheless had the benefit of discussions with senior serving and retired naval officers (*ibid.*, p.7).
Fig.17: Anthony Buzzard

Rear Admiral Sir Anthony Buzzard – in Denis Healey’s phrase “a pale intellectual monomaniac” – was contributing to strategic discussions as DNI as early as 1953. Although he was shunned by the defence establishment, his ideas on ‘graduated deterrence’ were to provide an important focus for the first scholarly discussions of nuclear strategy in Britain (pp.124-7; Imperial War Museum).
Fig. 18: Duncan Sandys
Author of the 1957 Defence White Paper, Sandys tends to appear a rather two-dimensional figure in conventional accounts. He was widely loathed by senior figures in the defence establishment, and brought to the job a track record of opposition to the Navy's carriers, but he was one of the few postwar political figures to regard defence as important to his career (p. 129).
Fig. 19: HMS *Victorious*

*Victorious* (left) with *Ark Royal* at Malta in November 1960. The ships had been exercising in the Mediterranean with *Hermes* and carriers of the US Sixth Fleet. *Victorious* almost certainly had a nuclear capability by this date. The following year she began her first East of Suez commission (pp. 140-2; McCart, *HMS Victorious*)
Fig.20: Peter Gretton

Vice Admiral Sir Peter Gretton retired as DCNS in 1963. Most unusually for a postwar senior naval officer, he had commanded a convoy escort in the war (here he is aboard HMS \textit{Wolverine}). He also produced a series of books and articles on naval strategy; with Buzzard, he was the most significant thinker to emerge from the Royal Navy during our period (pp 144, 147; Gretton, \textit{Convoy Escort Commander}).
Fig. 21: Red Beard delivery

This diagram shows the loft or toss bombing technique by which Royal Navy aircraft (in this case the Scimitar) would have delivered their Red Beard tactical nuclear weapons in anger. An alternative ‘over the shoulder’ attack profile was also exercised (PRO, AIR 2/13774).
Fig. 22: East of Suez

Chapter 5: Polaris and Beyond

Other nations are before us,
With their Sputniks and Explorers,
What can confidence restore us?

(Revd. E A Willis)

In the previous chapter, I have described the development of the idea of nuclear stalemate and have concluded that, once again, the Royal Navy was unenthusiastic about nuclear warfare and nuclear strategies in the late 1950s and early 1960s. But just as in the early 1950s plans for broken-backed warfare, for which the use of nuclear weapons would be irrelevant, coexisted with ambitions to become involved in nuclear weapons programmes and even to use nuclear weapons offensively, so in the later period the developing consensus on nuclear stalemate coexisted, sometimes uneasily, with other more positive thoughts on nuclear weapons. In particular, this period saw the success of the Polaris ballistic missile submarine programme in the US and the growth of British interest, up to the point in December 1962 when this missile was chosen, after the failure of Blue Streak and then Skybolt, as the basis for Britain's independent nuclear deterrent - a decision which was to stick for thirty years. In addition, although somewhat later, the 1960s saw a growth in naval enthusiasm for anti-submarine nuclear weapons. All nuclear issues became to an increasing extent politicised during this period, but although political decision-makers had the final say in British nuclear weapons policy, an account is needed here of the changes in naval thinking leading up to the introduction into service at the end of the 1960s of strategic and tactical nuclear weapons, Polaris and WE177, which were to remain operational until the 1990s.

This chapter seeks first to examine the Navy's attitude to the Polaris programme in the US, and to the missile's eventual adoption in Britain. I shall argue that even after 1962 Polaris was only accepted grudgingly in most naval circles. I shall examine along the way some familiar issues, including the reasons for the Navy's reluctance and the part played by Lord Mountbatten, as well as some less familiar problems, in particular the relationship between British and American naval perceptions of Polaris and the proposal, discussed from time to time, to base Polaris East of Suez. Finally, I shall attempt to outline developments during the period in anti-submarine weapons and the growing need felt by the Royal Navy for a nuclear depth bomb (NDB). I do not however intend to cover, except in so far as context is necessary, the high-level decision-making or transatlantic diplomacy surrounding the choice of British deterrent weapons, nor such related questions as test ban negotiations or the NATO multi-lateral force (MLF) proposals - topics which have been exhaustively covered elsewhere.1

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1 See esp. Clark, Nuclear Diplomacy, ch.8-11; Pierre, Nuclear Politics, ch.8-9; Baylis, Ambiguity and Deterrence, ch.9-10.
The American origins of Polaris

Although I have already mentioned in chapter three some early British efforts to drum up enthusiasm for studies of launching ballistic missiles from submarines, I have attempted to make the distinction between the studies of 1953-55 and Polaris. By Polaris, I mean not just a submarine-launched ballistic missile system but specifically a weapon of secure second strike retaliation and minimum deterrence. I believe the distinction to be important; indeed, it has been argued that it was CNO Arleigh Burke's success in the US in differentiating Polaris in this way that guaranteed its successful development. For Britain, it is important to recognise that Polaris in 1962 became the successor to the RAF's V-bombers as the visible expression of Britain's nuclear independence. The studies of 1953-55, by contrast, had seen a missile-firing submarine as the successor to the Navy's carriers as a contribution to the NATO Striking Fleet.

American work on submarine-launched missiles began immediately after the war with the help of emigre German scientists, who had been looking into the possibility of firing V-2 rockets from a towed barge at sea since 1942. For a variety of reasons, perhaps especially the USN's political need to oppose USAF nuclear programmes and the extremely hazardous nature of early liquid-fuelled missiles, research languished until the appearance in 1955 of the report of the Killian Panel, a high-level advisory body set up to look into the vulnerability of SAC to a surprise nuclear attack. The Panel's uncomfortable conclusions gave a considerable boost to a whole range of technological developments in the US, and left the USN feeling a political need to join the bandwagon of ballistic missile development. Most commentators agree that the decisive push in this direction was given by Admiral Arleigh Burke on his appointment as CNO in August 1955. Within twenty-four hours, Burke had called for reports on the progress of ballistic missile research, and within a week he had made up his mind to pursue the work vigorously. By October he was confidently rejecting advice that a submarine launched ballistic missile was impractical. Initially the US Navy was committed to a joint development with the Army of the liquid-fuelled ballistic missile Jupiter, and later to a solid-fuelled 'Jupiter-S.' During 1956, however, technological developments, especially the well known prediction by Edward Teller that a lightweight warhead would be available by the time the missile was ready, gave Burke the confidence to begin a separate naval Fleet Ballistic Missile (FBM) programme, given the name Polaris in December 1956. Kaplan's colourful account gives some idea of the bitterness of USN-USAF rivalry during this period, especially over the response to the growing realisation that nuclear parity was not far away. In this context the conclusions of the Naval

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2 Spinardi, From Polaris to Trident, p.34; Kaplan, Wizards of Armageddon pp.234-7.

3 The account of the US origins of Polaris which follows relies on secondary sources, in particular Spinardi, From Polaris to Trident, pp.19-34; Sapolsky, The Polaris Submarine Development; Rosenberg, 'Arleigh Albert Burke' in Love, ed, The Chiefs of Naval Operations, pp.263-319; Freedman, The Evolution of Nuclear Strategy, pp.158-60; and Kaplan, Wizards of Armageddon, pp.233-8.

4 Spinardi, From Polaris to Trident, p.24.

5 Kaplan, Wizards of Armageddon, pp.265-6.
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Warfare Analysis Group (NAWAG), a group of contractors sponsored by Burke’s Long Range Objectives Group Op-93, became extremely important. NAWAG concluded in 1957 that an FBM submarine would be valuable in an era of mutual deterrence specifically as an invulnerable second strike weapon, guaranteeing a minimum or ‘finite’ – but nevertheless unacceptable – level of damage to the USSR in retaliation for any atomic attack on the US. At the same time, because it represented a minimum deterrent, the FBM might allow a reduction in the overall requirement for nuclear weapons and greater investment in limited war capabilities to meet lower-level Soviet challenges. NAVAG’s conclusions were reinforced to some extent in November 1957 by the influential Gaiter Committee. As we have seen in chapter four, some of these conclusions had already been reached in academic and some military and naval circles in the UK. The concept of second strike invulnerability took longer however to gain currency on this side of the Atlantic; I shall argue below that the Royal Navy never quite understood, or at least never felt the need to use, the strategic arguments for Polaris in the same way as Burke. By 1958, although meeting a certain amount of opposition within the USN itself, which I shall discuss later, the Polaris programme was well established, under the control of Admiral William Raborn’s Special Projects Office and closely watched over by Burke himself. By 1959, the submarine, missile and warhead were nearing completion and the finite deterrence concept was being publicised openly. Even at this stage, Burke had to fight bitter battles with the USAF, which was now trying to assert operational control over Polaris targeting. Again however by skilfully differentiating the role of Polaris, this time by emphasising its importance in countervalue targeting of Soviet cities, Burke was able to protect his programme. His skill in these Washington battles should not be underestimated: not only did he carve a niche for Polaris, but one in which he could display even the weaknesses of the system without disadvantage. The problems of early inertial missile guidance systems made Polaris inaccurate compared to land-based missiles, but if countervalue rather than counterforce targeting were required, then this became perfectly acceptable.

Early Royal Navy reactions to Polaris

The Royal Navy was certainly aware of the Polaris programme from an early date, both through routine liaison channels and at a more senior level through the developing relationship between Burke and Mountbatten. In August 1955, for example, the First Sea Lord received a bumper information pack on naval guided weapons following a conversation with Deputy Secretary of the Navy Gates. This described ballistic missile research as unpromising, given problems of accuracy, payload, launch arrangements and liquid fuel handling, and highlighted instead such

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projects as Triton, a new ramjet cruise missile. The following month, on the other hand, the Admiralty’s senior liaison officer in Washington wrote to FOS(M) that “CNO is veering towards a . . . proposal that a first-stage ballistic missile with perhaps 1200 miles range could be available almost as soon.” With typical selective memory, Mountbatten later recalled a role for himself in encouraging Burke’s efforts when during a visit to the USS Albacore in November 1955 the CNO was wrestling with the political problems of the IRBM programme. To be fair, the First Sea Lord had expressed his own interest in submarine-launched ballistic missiles even before the visit, and certainly did attempt to give more impetus to Royal Navy studies when he got home, especially after the news that the Secretary of Defense had approved the USN’s involvement in the IRBM. A conference on future submarine policy in February 1956 discussed US progress with submarine projects including the nuclear-powered USS Nautilus, the teardrop-hulled USS Albacore and the FBM, but recommended postponing any serious consideration of the latter for two or three years.

In May 1957 interest was rekindled in the Admiralty by Senator Henry Jackson, a noted supporter of Polaris, who drew attention in a congressional speech to the advantages of the system specifically for Britain:

These weapons would not be dotting the British countryside – near London or Manchester or Edinburgh. They would be deployed far out to sea – well beyond direct fall-out range of Britain’s population. A sneak attack from Moscow, if designed to eliminate this sea-based deterrent, would not fall on the densely populated British countryside – it would fall instead on the empty stretches of the Atlantic and Arctic Oceans. For purposes of defense, Britain would no longer be a tiny country . . . Britain’s frontiers would shift from the Hebrides and the Cliffs of Dover – to the far reaches of the oceans.

D of P’s comments to Mountbatten on this speech were however sceptical: the system did not yet exist, and its relative cost compared to bombers or land-based missiles was uncertain. Its efficacy in drawing fire away from British cities was also questioned, although the argument would later be employed by the Navy in inter-service debates. Nevertheless by September the Board had decided upon a

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9 See Mountbatten’s retrospective manuscript note on meeting of 4 Nov 1955 in Hartley Library, MB1/I342A, in which he recalls offering Burke a liaison officer for the programme; other evidence suggests no such offer was made until 1958, and even then at Burke’s instigation (PRO, Burke to Mountbatten 16 May 1958 in ADM 205/179; Hartley Library, Mountbatten to Burke 22 May 1958 in MB1/I447).


11 See papers in section 10D of PRO, ADM 205/112.

12 Hartley Library, copy of speech of 27 May 1957 in MB1/I342A; also mentioned by Nailor in *The Nassau Connection*, p.3.

13 Hartley Library, D of P to First Sea Lord 31 May 1957 in MB1/I342A.
"discreet" mention of the SSBN in its ‘Role of the Navy’ paper for the Minister of Defence, and an equally discreet reference was made in the statement accompanying the 1958 Navy Estimates: “With the capability of launching ballistic missiles, the nuclear submarine becomes one of the master weapons of war, whether the war be nuclear or otherwise.”14 In October 1957 Selkirk, the new First Lord, greeted a Board paper on nuclear-powered ballistic missile submarines, including an account of US work, enthusiastically:

The First Lord said that he was convinced that this combination of a totally new type of submarine with a totally new kind of weapon must represent a fundamental change in the strategic application of sea power... the only question for decision was when, and not whether, the Admiralty should seek the resources to introduce this combination into the Royal Navy.15

Selkirk's professional advice on this occasion was more cautious, and the Board agreed that it would be inexpedient for the present to urge any claim to equip Royal Naval submarines with ballistic missiles, although there would be an advantage in drawing attention discreetly to such publicity as might be given in the USA.”16 Nevertheless, from this time there is increasing evidence of senior British naval interest in Polaris, with Selkirk making much of the running, writing in glowing terms to his predecessor Lord Hailsham and to the editor of The Times.17 By mid-1957, Crowe records that a “constant flow” of information on Polaris was arriving through liaison channels in Washington, and in November Burke wrote to Mountbatten with an enthusiastic account of progress.18 The interest now building up led to the formation of a working party in January 1958 under DCNS, which reported two months later.

The report listed a number of advantages of Polaris over the existing deterrent project Blue Streak. A force of six to eight submarines would have the same striking power but would be mobile and difficult to counter-attack, also tending to draw any counter-attack away from targets in the mainland UK; the missile would use solid fuel; it would create difficulties for Soviet defences by varying the possible direction of attack; the submarines would be capable of use as SSNs after their missiles were expended; and they could be used against China as well as Russia. Even the morale advantages of cruising at sea, as opposed to manning a silo, were adduced: Polaris crews would be “truly employed on active service.” Blue Streak by contrast was roundly criticised as a “Maginot concept...
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It has no other use; expenditure on fixed missile sites may well fall into the same category as the effort put into placing seaward facing guns at Singapore some twenty years ago.” The only disadvantages of Polaris would be its technological reliance on the US and its cost, in dollars and design effort. Primitive costings however suggested that eight submarines could still be cheaper than Blue Streak. 19

The list of advantages was as interesting for its omissions as for its inclusions. In particular, although it was argued that by eliminating the vulnerability of Blue Streak the ‘use them or lose them’ problem would go away, Polaris was not actually described as a ‘withholding’ or ‘second strike’ weapon; rather it was a weapon whose use could be considered more calmly. Nor is there any indication that the Admiralty grasped the potential of the ‘finite’ or ‘minimum deterrence’ idea at this stage. It is slightly curious that the Admiralty contrived to misunderstand US attitudes to Polaris in this way. This may be for a number of reasons. First, the Navy perhaps lacked the inclination to upset the applecart in Whitehall once again, so soon after the alarming precedent of the Sandys review, and given Mountbatten’s satisfaction with his progress post-Sandys in defending the Navy’s interests.

Second, since the British deterrent force was much smaller than that of the US, it was closer to losing its viability altogether if reduced further in size; perhaps a ‘minimum deterrent’ had already been achieved. Third, the Navy’s ingrained lack of interest in academic strategies may have led it to disregard elaborate American concepts of secure second strike countervalue retaliation. It is interesting in this context to note that differences between the UK and US in academic strategy were becoming marked, for example between Blackett and Albert Wohlstetter.

Wohlstetter had concluded by 1958 that mutual deterrence begat instability and a need for greatly increased American efforts, in weapons technology and strategic thought, to regain a margin of superiority. Blackett on the other hand questioned these “bizarre . . . practical conclusions” and argued instead that mutual deterrence would make for stability in the actions of real decision-makers in a crisis. He gave further spice to his demolition of Wohlstetter’s argument by apologising in advance for the “nauseating inhumanity” of many of the considerations involved. 20 Blackett’s practical conclusions will surely have been more appealing to naval readers than the baroque nuclear strategy of the American school, which Burke’s ‘finite deterrence’ may have resembled. Finally, and perhaps most importantly, the Navy lacked a burning desire to justify itself in nuclear terms.

Instead of using Polaris, as Burke had done, to try to drive down the overall requirement for nuclear weapons and free up expenditure for conventional forces, the Royal Navy continued to suspect that the ‘nuclear sufficiency’ argument undermined the requirement for any British deterrent force and therefore conflicted with advocacy of Polaris. Nevertheless, the SSBN continued to attract a certain amount of interest. The Board was sufficiently impressed by the 1958 report to conclude that:

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Notwithstanding the doubts which inevitably obscured several of the factors . . . the Board decided that the strategical advantages of substituting such vessels for the Blue Streak missile were so overwhelming that the policy advocated in the memorandum should be adopted in principle as a major naval objective.

. . . but not so impressed as to recommend sending the report unsolicited to the Chiefs or the Minister of Defence:

In reaching this conclusion the Board were influenced not only by the bitter opposition which the Air Ministry must be expected to offer to the substitution of the seaborne Polaris for the land-based Blue Streak; but also by the risk that if too great an enthusiasm were shown prematurely for the Polaris project, the Admiralty would be pressed to realise it without any addition to Navy votes.21

Presently Sandys specifically requested the Admiralty’s views on Polaris, and was sent the paper. The Air Ministry reacted as strongly as predicted.22 The net effect was to stall any immediate progress as the Admiralty, not for the first or last time, adopted a ‘wait and see’ strategy. Although Burke had seemed positive about the possibility of US technical help with Polaris, the Admiralty also concluded that the US Atomic Energy Act, even after its impending revision, would not in the end be interpreted favourably.23 At the same time Burke, for all his passionate enthusiasm for Polaris, advised caution in further correspondence with Mountbatten, twice citing the impact of nuclear weapons expenditure on important conventional capabilities and offering the advice that the UK should not join the US programme until a couple of years after it bore fruit.24 As Clark suggests, such advice should be seen in the light of Burke’s domestic concerns: he will not have wanted assistance to the UK to delay his own programme at a crucial stage.25 We should not neglect the possibility however that Burke was at the same time anxious to preserve and even promote Mountbatten’s interest in Polaris, in order to add a string of British involvement to the bow he wielded in his Washington battles with the USAF. He is likely to have been quite content with the First Sea Lord’s avowed intention to “keep the Polaris pot boiling,” and to this end he invited the Royal Navy in May 1958 to supply a liaison officer to the programme.26

Burke continued to press the specific strategic advantages of Polaris – ‘finite deterrence’ and ‘withholding’ – but Mountbatten continued to miss the point somewhat, despite professing himself exhilarated “to be able to exchange ideas on a

21 PRO, Board Minute 5216 of 27 March 1958 in ADM 167/151.
22 PRO, papers in ADM 1/28949; Selkirk to Sandys of 21 Apr 1958 and Air Ministry brief of 2 Jun 1958 in ADM 1/27375.
23 PRO, H of M(I) to D Sec(G) of 30 Apr 1958 in ADM 1/28949.
26 PRO, Mountbatten to Burke 8 May 1958 (drafted by Mackay) in ADM 205/179; correspondence on liaison officer May to July 1958 in ibid., ADM 1/27375 and Hartley Library, MB1/447. One Cdr Simeon eventually left for the US in October.
project which promises to transform the strategic deployment of the deterrent. By September Mountbatten believed that the nuclear sufficiency and Polaris arguments could not be reconciled—"to bid for Polaris now would unbalance our arguments concerning nuclear sufficiency"—although as US writers have argued this was precisely the circle which Burke so successfully squared in the US internal debates. Thus by the summer of 1958 Polaris had been located in the minds of British defence decision-makers as a possible future deterrent system, but still lacked a serious advocate. The Admiralty continued, as I have argued in chapter four, to press the nuclear sufficiency argument more vigorously.

Prudent staff work

Throughout 1959 and 1960, Polaris remained on the agenda in naval circles, not least because of the considerably greater political interest in deterrent weapons during these years. Successive incarnations of the British Nuclear Deterrent Study Group (BNDSG) under the MoD Permanent Secretary reviewed the options for a deterrent whose ‘independence’ became increasingly important to the Conservative government and whose very continuation became an increasingly divisive question for the Labour opposition. The story has been told in greater detail elsewhere, but in brief the Blue Streak missile to which Sandys had committed in 1957 began to look extremely unattractive both strategically and financially from around the end of the following year, until in February 1960 the Cabinet decided to abandon its development for military purposes. The following month, after a fairly frantic search for alternatives during which serious consideration was given to the possible procurement of Polaris, Macmillan secured Eisenhower’s agreement at Camp David to the supply of the air-launched ballistic missile Skybolt. Various other issues, including the deployment of American Thor IRBMs to the UK under a dual-key system, the negotiations for a US Navy Polaris base at Holy Loch in Scotland, nuclear test ban negotiations and the introduction of the NATO MLF proposals, conspired to push real decision-making on nuclear policy issues still further into the stratosphere and beyond the scope of this study. Meanwhile however, at all levels within the Admiralty, what Nailor has called “prudent staff-work, unrelated perhaps to the preferences of the Naval Staff, but in line with the public pronouncements of the new Minister of Defence,” continued.

Thus in February 1959 after the establishment of the first BNDSG under Sir Richard Powell we find Mountbatten writing again to Burke asking for “all the ammunition we can possibly get to support our case for a naval deterrent.” Burke was happy to oblige, despite his advice less than a year previously to wait until after Polaris had entered service in the US. In particular, he held out the possibility of

27 PRO, Burke to Mountbatten 14 Apr 1958, Mountbatten to Burke 8 May 1958 in ADM 205/179.

28 PRO, First Sea Lord’s weekly meeting 17 Sept 1958 in ADM 205/172 (I claim no success for Burke in getting his strategy adopted in the face of USAF opposition, but he did get his weapons system funded and deployed).

29 See the various accounts mentioned in footnote 1 above.

30 Nailor, The Nassau Connection, p.5.
US Navy support in securing the supply of missiles, and noted that the USAEC had already given warhead design information to their British counterparts. He also pressed on Mountbatten once again the importance of the finite deterrence concept. Here, and later in the year, was concerted lobbying by Mountbatten, and by UKAEA Chairman Edwin Plowden, which revealed in response a real US willingness at an official level to help the UK with a Polaris project.

The Board of Admiralty continued, however, to take a more cautious view. A ‘mind-clearing’ paper from Mackay in June 1959 actually recommended waiting for ten years until the US had ironed out any and all problems with Polaris: “By the end of this period . . . it will be a proved operational weapon at sea. It will be available to us, if we want it.” Mackay recommended that the Board should emphasise the limitations of Polaris, and only agree on sufferance to a programme “in the national interest” sometime after 1965. Later in the year when the Board discussed a paper intended specifically for the BNDSO, a costed plan had been drawn up for eight submarines, using as much American design help as possible to lessen any impact on existing building and modernisation programmes for the conventional Navy. The Mk.1 Polaris was now considered obsolescent, and although the longer range Mk.2 might be an acceptable alternative, this assumption was questioned by the Board. The paper was passed on without a specific recommendation. Nor can I find any evidence of Admiralty enthusiasm for the conclusions of a Joint Global War Committee (JGWC) report completed in autumn 1959 and praising the advantages of Polaris-type weapons, less vulnerable than Blue Streak but comparable or even better in their ability to damage the USSR. Interestingly, command and control communications, often cited by critics as a weakness of a submarine-based deterrent, were not thought to be a problem by the JGWC since the best launch sites would probably be in relatively small areas off Eastern Scotland, Malta and Cyprus.

Despite the brisk cheerfulness of future First Sea Lord Mike Le Fanu, similar half-heartedness greeted the report he produced the following summer on the Admiralty HQ organisation required for a Polaris programme. Le Fanu’s remit from Controller had been to make recommendations on fielding the submarines “as soon as possible with the minimum adverse effect on the remainder of the fleet.” An eight-boat Polaris squadron was still envisaged at this stage, although options

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31 Hartley Library, Mountbatten to Burke 17 Feb 1959 in MB1/1586; PRO, Burke to Mountbatten 28 Feb 1959 in ADM 205/163 (the warhead here must be the W-47 used for Polaris A-1, rather than at this stage the triple-headed W-58 used for Polaris A-3).

32 See records of meetings and dinners with USAEC Chairman McCone in October 1959, and Plowden’s letter forwarded by Mountbatten to Powell 6 Nov 1959, all in Hartley Library, MB1/J353; also Burke to Mountbatten 20 May 1959 in MB1/J40.


ranging from three to ten boats were mentioned at various stages of drafting. With two boats refitting at any one time and a 94-day patrol cycle using double crews, four boats would be on patrol at any one time and 1600 men would be required to man the squadron assuming a shore base, or 2000 if supported afloat by a depot ship. Despite the remit of the study, it was clear that conflicts of interest with the rest of the Navy, especially in skilled manpower, could not be avoided. Le Fanu was anxious not to devise a structure for a 'private navy' but did recommend an ACNS(Polaris) and a Polaris Executive within the Admiralty to carry out the project, subcontracting work as required to elements of the existing organisation. The Board stopped short however of endorsing Le Fanu's work, Admiralty Secretary J G Lang worrying that anything short of outright purchase of submarines from the US would still create unacceptable problems for the rest of the fleet. Others worried about the Polaris Executive idea and the prospect of an "Admiralty within the Admiralty."  

In this context recently declassified papers on the Admiralty's attitudes to the Holy Loch base negotiations, moving into their final phase during the summer of 1960, are interesting. Briefly, Macmillan had agreed with Eisenhower at their March meeting at Camp David, in implicit exchange for Skybolt, to permit the US Navy to base a depot ship and Polaris submarines in the loch. Unfortunately the summit agreement was vague and capable of selective reinterpretation, after the fashion of such understandings. During the following months, British representatives made repeated efforts to 'cash the cheque' of Holy Loch a second time, in exchange for concessions over the MLF proposals or even in exchange for agreement to supply complete Polaris submarines. Negotiators also made difficulties over control arrangements, and over the siting of the base, suggesting the more remote Loch Linhe, Loch Ewe, Loch Eriboll, Stornoway, Orkney or even Shetland. Ultimately a full agreement on the base was reached in October 1960 without further US concessions, although British efforts to move the goalposts had caused some ill feeling in the meantime. First Sea Lord Caspar John and the Admiralty's senior liaison officer in Washington, Admiral Thistleton-Smith, were anxious to blame this on the politicians. A number of naval comments during the negotiations have recently been reported in a British newspaper. Walter Couchman (VCNS) wrote to Thistleton-Smith that "the expense of providing ourselves with a new deterrent force . . . is growing so steep, that in the end I should not be altogether surprised if Her Majesty's Government decided that when the V-bombers fade out, we could not afford another nuclear deterrent." John was anxious that Burke should not feel the Royal Navy was behind the efforts to secure a Polaris purchase in exchange for Holy Loch: "I do want to assure you that the line adopted by Mr Watkinson was chosen by him entirely for . . . political reasons . . . and was

36 PRO, J G Lang note of 23 Jun 1960 covering draft report in ADM 205/211; Board memo B1353 of 25 Jul 1960 in ADM 167/157 outlining conclusions and minute 5431 of 28 Jul 1960 in ADM 167/156 (the report was referred to Ctrlr. VCNS and Lang for further work).

37 See esp. Clark, Nuclear Diplomacy, p.268.

in no way inspired by the Admiralty." 39  Lang by contrast seems to have been more anxious to support the Minister, although it seems clear, given his remarks on Le Fanu's report, that his motivation was to obtain Polaris, if necessary, without significant impact on other naval programmes, rather than to obtain Polaris tout court. The depot ship USS Proteus arrived in Holy Loch without fanfare in March 1961, later to be accompanied by a floating dock, sundry other auxiliary vessels and the SSBNs of the US Navy's 14th Submarine Squadron.

There can be little doubt that by 1960 Polaris was viewed by most academic and military observers, and by the politicians, as a serious contender to carry Britain's deterrent in the long term, perhaps from a strategic point of view the best contender. Macmillan later recalled his own attempts to persuade Eisenhower that it should be offered if Skybolt were to fail. 40 By April 1960, the long-term options under consideration by the BNDSG, now under the chairmanship of Powell's successor Sir Edward Playfair, almost all included Polaris. 41 The "prudent staff-work" described by Nailor continued into the winter of 1960-61 and beyond, with the visit to the US for example of a fact-finding mission under S J Palmer, the Assistant DNC. It is noticeable, however, that the series of set piece Admiralty studies of the subject dried up during 1961; the impression is that the Royal Navy was once again playing a waiting game, conscious that the technical success of Polaris in the US was assured but that political decisions, over which the Admiralty had little real influence, would determine the future of any British programme. There was also a feeling that more studies would only be appropriate if a definite commitment could be made. 42 Crowe concluded on the basis of near-contemporary interviews that Admiralty views on Polaris were now changing:

It was rather clear that irrespective of the feeling of professional officers the Government was determined to maintain an independent deterrent ... Although their Lordships still disliked assuming responsibility for building a missile submarine force, they determined to keep the record straight as to the virtues of Polaris. If the politicians insisted on further modernising the deterrent, the Admiralty would press on them the superiority of a seaborne system over an airborne one ... The days of being reluctant were over. The Fleet was being thrust into a deterrent role by forces beyond its control. The object was now to carry out this mission with competence and elan. The Board of Admiralty had confidence in Polaris as a deterrent weapons system even if it perhaps did not fully share the Government's affection for the concept of deterrence. 43

39 Fenton, 'Officials played politics with nuclear missiles' in The Daily Telegraph, 31 Jul 1998, p.6 (Fenton quotes a number of PRO documents without giving specific references; one is certainly John to Burke of 10 Jun 1960 in ADM 205/222; this and other papers, here and in ADM 1/29347, tell the full story of the negotiations).

40 See Clark, Nuclear Diplomacy, p.291.

41 ibid. p.281.

42 Nailor, The Nassau Connection, p.5; PRO, Playfair to Watkinson of 14 Nov 1960 in DEFE 13/617. The team's report in ADM 1/29349 is still classified. There is no mention of further Polaris studies in those 1961 Board papers so far declassified in ADM 167/154 and ADM 167/160.

Outside the Admiralty building, a number of writers in the Naval Review now expressed a similar enthusiasm for Polaris, although little enough for the concept of deterrence itself; some pointed out the implicit contradiction in these two views, but most seemed happy enough.44 Not so, however, after Nassau. There is no doubting the undercurrent of opposition to Polaris that the final Anglo-American decision brought to the surface. In a tirade of an editorial, the Naval Review's Vice Admiral Sir Aubrey Mansergh bellowed that:

To prevent war by threatening to slaughter the enemy's population on a vast scale... is the unpalatable task that the Navy seems shortly to be stuck with... the Admiralty (if such an institution is to survive the changes) is destined to wage a constant, and probably losing, battle against the Treasury to prevent the 'deterrent force' swamping and distorting the 'balanced fleet'... If this is a good bargain the writer will eat the editorial hat... Deterrent or no the primary task of the Navy must remain the protection of our seaborne trade on which every activity in this country depends... The 'V' bomber force, besides handling the deterrent could be useful in a 'conventional war' role; 'Polaris' submarines could not, and so will be a dead loss to our real defence forces. At the same time their cost will almost inevitably prejudice the building of real warships.45

A rash of articles in the naval press expressed more or less the same view: Polaris "could, unless it is handled with proper attention to the true values of sea power, prove to be an embarrassment"... "In terms of distorted policies, unbalanced forces, self-complacency and sheer financial expenditure, the cost of maintaining our independent deterrent has been enormous."46 Some commentators were more measured: "The precise rights and wrongs of a deterrent policy... [are] not the Navy's business. The charge has been laid upon it."47 Surely one of the most revealing comments, however, came from the professional head of the Royal Navy himself:

Caspar was not in the least enamoured by the prospect of having to accept the responsibility to deploy Britain's nuclear deterrent. 'A filthy week,' be recorded in December 1962. 'This millstone of Polaris hung round our necks. I've been shying off the damned things for 5½ years. They are potential wreckers of the real Navy and my final months are going to be a battle to preserve some sort of balance in our affairs.'48


48 John, Caspar John, p.197.
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The Navy has come in for a good deal of criticism in secondary works for its attitude to Polaris in the whole period 1958-62 - criticism which has come from both directions. For Pierre and Crowe, the Navy failed to make a case for Polaris soon enough: "In retrospect the failure of the Royal Navy to make a strong case to the cabinet for acquiring Polaris rather than Skybolt before, and at the time of, the Blue Streak cancellation, was an irresponsible mistake." For Navias, on the other hand, the Navy was at fault for too great an enthusiasm: "Throughout, the Navy's logic appears to have been that in nuclear matters it wished to wrest control of the deterrent from the RAF but it would have to play its cards very carefully so as not to overly antagonise the Air Force in the process . . . the Navy's guiding principle often remained not nuclear independence so much as her own bureaucratic aggrandisement." Both criticisms seem to me to be harsh; it is time to digress for a moment to attempt to understand in more depth the Navy's attitudes to Polaris in the years leading up to its adoption.

Not willing to gamble

There is no doubting that a range of views existed: contrast Caspar John's gloom, for example, with the enthusiasm of some of Mountbatten's letters to Burke - discussed at a little more length below - or with Le Fanu: "This is a big, big deal . . . we have got to set new standards of design and workmanship. We are going to enjoy it enormously." As will be clear from the tenor of the discussion so far, however, I believe that on balance the Royal Navy was very reluctant to accept the burden of responsibility for Polaris, right up to and beyond December 1962. In this sense, I find Pierre's complaint somewhat better justified than Navias', although as Clark has now convincingly argued, Pierre too is fairly wide of the mark, at least in specifics: Polaris would not necessarily have been available to the UK in 1960, no matter how bard the Navy had pressed. In any case, my purpose here is to understand rather than to condemn.

Reasons for the Navy's reluctance are not hard to find in the existing literature. One was undoubtedly the 'cavalry traditionalism' of senior officers: the route to personal advancement lay in the surface Navy, and not through submarines. It is interesting that even after the Polaris decision was taken, the leadership of the project was considered a poor career move for such a high flyer as future First Sea Lord Peter Hill-Norton. As Nailor rather nicely puts it, "some submariners . . . felt that the Royal Navy was emotionally anti-submarine rather than pro-submarine."  

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50 Speech to the Institute of Marine Engineers, 1963, quoted in Baker, Dry Ginger, p.172 (to be fair, Le Fanu could hardly have stunted his enthusiasm in front of such an audience).  
51 Clark, Nuclear Diplomacy, pp.290-6.  
52 See e.g., Crowe, 'Policy Roots,' pp.277-88; Grove, Vanguard to Trident, pp.236-8; Clark, Nuclear Diplomacy, pp.283-95.  
Another internal bureaucratic reason for opposition to Polaris is brought out in the response to Le Fanu’s report in 1960 on project organisation. Admiralty officials and senior officers alike viewed with horror the internal power and influence of the Polaris and SSN project supremos in the US, Raborn and Rickover – Admirals, many thought, of two proud and private navies. Rickover in addition was personally difficult, even after Mountbatten turned on the charm to make him a special friend of the British SSN project. Not only were submariners politically weak, and something of a race apart – forming only two percent of the officer corps – but they could not even agree among themselves on the need for missile submarines, given the presence on the building slips in the same period of the first nuclear-powered hunter-killer SSNs. The idea of a ‘hybrid’ SSN-SSBN was seriously suggested to overcome worries about relative priorities, but eventually discarded on grounds of impracticality, potential delay, and the provisions of the Nassau agreement: if Polaris were subordinate to SACEUR except where ‘supreme national interests’ were at stake, then its operation in an SSN role would be heavily circumscribed. An internal Polaris lobby never therefore emerged within the Admiralty. Nor did an external lobby appear: Britain’s shipbuilders were neither as powerful nor as well organised as the aircraft manufacturers, and the small circle of academic strategists had little influence until one of their number, Denis Healey, became Labour Defence Minister in 1964.

Above all, the Navy was horrified by the sheer cost of a missile submarine programme – “for years the root of the Admiralty’s reluctance to accept Polaris.” Estimates of the financial cost produced in 1959-60 suggested figures of £327-347 millions for a squadron of eight boats commissioning between 1969 and 1974 – this at a time when the total annual naval budget ran to £371-389 millions. Such an expenditure was in no sense justified according to the Board’s sense of priorities: “its share of the UK defence budget was barely sufficient to assure the more urgent needs of a surface fleet.” Nor was the financial cost, especially in dollars, the end of the matter. D of P’s 1959 estimate of the uniformed manpower requirements of a Polaris squadron added up to a light fleet carrier’s worth, at a time when the Navy faced numerous recruitment problems, as well as Treasury pressure on its overall manpower total. In key areas, such as drawing office and other technical staff, Polaris promised to be still more of a cuckoo in the nest. Hence the endless repetition in Admiralty documents of the mantra that Polaris could not be afforded without a massive injection of cash, or as a ‘national’ project over and above the naval budget: “if too great an enthusiasm were shown . . . the Admiralty would be

54 See Ziegler, Mountbatten, p.558.


57 See PRO, Board Minute 5347 of 10 Sept 1959 in ADM 167/155; Le Fanu's draft report under cover of Lang's note of 23 Jun 1960 in ADM 205/211; Grove, Vanguard to Trident, budgetary figures in app.6.

58 Zuckerman, Monkeys, Men and Missiles, p.237.
pressed to realise it without any addition to Navy votes" . . . "the project would come to nothing if it were to be regarded as a purely naval commitment. It must be on national lines" . . . "in the national interest" . . . "it is not strictly a naval weapon, it is a strategic weapon" . . . "the background assumption [is] that the Admiralty only supports a nuclear deterrent - even if carried in submarines - if it does not cut too fiercely into conventional forces" . . . "my final months are going to be a battle to preserve some sort of balance in our affairs." 59 Grove makes the important point that expenditure on a new generation of aircraft carriers was on the financial horizon, and that the Admiralty will have been concerned above all to secure the future of these capital ships 60 I have already outlined in chapter four the growing importance of limited war strategies East of Suez in justifying the carrier fleet, and the extent to which such strategies preoccupied the Chiefs and JPS for example during 1960; I have argued too that pre-nuclear conventional anti-submarine warfare in the North Atlantic was receiving attention. Nuclear deterrence was simply not as important to the Royal Navy’s perception of itself as these other concerns; the Admiralty repeatedly made this clear during the nuclear sufficiency debates.

Interestingly, similar concerns had been expressed, and to some extent vindicated, in the US. Sapolsky records that "as a major innovation in naval weapons, the FBM would be certain to alter career opportunities within the officer corps, favouring particular types of training over others. It is not surprising that naval officers tied to outmoded technologies found it difficult to appreciate the benefits of an innovation which challenged their role in life." 61 There was opposition to the idea of twin ‘blue’ and ‘gold’ crews: how could a US Navy vessel possibly have two commanding officers? Money was tight, and other projects including Triton and Regulus II fell by the wayside; SSNs were delayed and even expenditure on the carrier fleet began to look vulnerable as the cost of Polaris nudged ten percent of the naval budget in the peak year of 1962. Manpower was diverted from other programmes, and technical problems with important conventional weapons including Terrier, Talos and Tartar went unsolved as a result. Sapolsky’s calculations confirm the suspicions of some US Navy officers at the time that Polaris was having a more serious impact than many would admit. 62 Given the amount of information flowing between the US and UK there can be little doubt that such considerations coloured British perceptions.

Sapolsky relates that leadership, skilful high-level advocacy and above all commitment ensured the success of Polaris in the US: "the Polaris was devised and


60 Grove, Vanguard to Trident, p.236.


built by true believers.” In Britain, meanwhile, such commitment was not present. The ease of waiting and seeing, at all stages and at all levels, should not be underestimated. Polaris was not a proven weapons system until its first successful live firing in July 1960, and the USS *George Washington* did not begin her first deterrent patrol until the following November. Even then, the staged approach of the Polaris programme meant that only the short-range (1200-mile) A-1 missile was available. The longer-range (2500-mile) and more desirable A-3 was still enticingly under development; serious work had begun in 1959, but a new warhead system was necessary and the first successful launch came only in October 1963, with deployment following a year later. Arleigh Burke’s advice to attend the outcome of the programme must have been very welcome in April 1958. Two years previously, as we have seen, a positive decision to wait and see had already been taken; in 1959, Mackay counselled waiting a full decade. I mentioned in the introduction the tendency of the British civil service to adopt a reactive posture in response to almost any problem, and to postpone decision-making where possible. These tendencies should not be exaggerated, but were surely present in the Admiralty during these years.

It would be a mistake therefore to see, at any stage, any great enthusiasm behind the Admiralty’s ‘prudent’ investigations into Polaris. Even in the period immediately leading up to Nassau when Skybolt, a pet RAF project and therefore unpopular in naval circles, was in clear difficulties, no dramatic steps were taken to press for the submarine system. Rather surprisingly, the liaison officer post created in 1958 was actually almost abolished in the summer of 1962. The Admiralty was too afraid of being asked to put its money where its mouth was, and only came to accept Polaris as a political decision, a *deus ex machina*. Grove’s judgement is surely correct: “The Naval Staff could see that the government was totally committed to an independent deterrent. In these circumstances the Royal Navy might as well be the operating service, especially as it could offer a system it genuinely felt was better and more cost effective.” Until then, “the Board of Admiralty was not willing to gamble on Polaris at the risk of injuring what it believed to be the Navy’s more important interests.”

Mountbatten: enthusiast and conspirator?

No exploration of Royal Navy attitudes to Polaris can quite be concluded, however, without addressing the views of one man in particular. Vain, devious, brilliant – ‘hero of our time’ – Admiral of the Fleet Earl Mountbatten of Burma was quite the most colourful figure in postwar British naval history, perhaps in postwar British history. He was also extremely influential, as First Sea Lord to 1959 and Chief of

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64 Dates from Gibson, *The Nuclear Weapons of the United States*, ch.2; see also Spinardi, *From Polaris to Trident*, ch.4-5.


66 Grove, *Vanguard to Trident*, p.237.

Defence Staff thereafter, in the very years under discussion. Many commentators have noted his periodic statements of enthusiastic support for Polaris, and readers may be forgiven for thinking that, in coming thus far to such a firm conclusion that the Navy disliked the whole idea of Polaris, I have glossed over the involvement of the one man best able to influence opinions in the other direction. Some writers have even suggested a ‘pro-Polaris conspiracy’ involving Mountbatten, waiting all the while to steal Britain’s deterrent from the RAF and claim it for his own. The fact that Zuckerman took the trouble in his autobiography to pooh-pooh any such idea — “The belief in RAF circles that the Royal Navy, particularly in the person of Dickie Mountbatten, had been intent on stealing the nuclear deterrent role from Bomber Command was, to the best of my knowledge, groundless” — only increases the suspicion. Zuckerman and Mountbatten were extremely close in Whitehall, and widely disliked for it. Moreover, some of the arguments Zuckerman advances do not hold water.

That Mountbatten repeatedly, over a period of many years, mentioned Polaris with great enthusiasm is undeniable. His involvement in 1955 has already been mentioned: “I still feel we should go into the question of what medium range ballistic missile can be fitted to our ships or submarines.” Again in 1958, although Selkirk had probably invested more political capital, the First Sea Lord “considered that we must go for a weapon which could be carried on a submarine.” In 1959, Mountbatten wrote to Burke requesting “all the ammunition we can possibly get to support our case for a naval deterrent.” Later, perhaps still more revealingly, he wrote with a “final request” to Burke as First Sea Lord:

> With Dreadnought well on the way, Polaris is the great hope of the future, which you and I share. I was delighted to see newspaper reports this week that its recent firings had been so successful that the USAF was threatening to take it over! This will help us, like everything else you are doing, to fight the Polaris battle here.

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68 On Mountbatten’s enthusiasm, see Grove, Vanguard to Trident, pp.236-7; Navias, Nuclear Weapons and British Strategic Planning, pp.232-6; Clark, Nuclear Diplomacy, pp.284-9.

69 See Mensul, Countdown, pp.117-9; Clark, Nuclear Diplomacy, p.288.

70 Zuckerman, Monkeys, Men and Missiles, pp.265-6.

71 ibid, p.266. There had, for example, been Polaris costings prepared before December 1962, and not just on the back of an envelope: see e.g., PRO, Board memo B1417 of 7 May 1962 in ADM 167/154, well within Zuckerman’s reign as Chief Scientific Adviser, which specifically mentions Polaris costings; these had been kept separate from regular Navy budgeting. On the other hand, Zuckerman is quite right to note no disappointment in naval circles at the government’s failure to choose Polaris over Skybolt in 1960.

72 PRO, Mountbatten to DCNS 25 Nov 1955 in ADM 205/106 (also in Hartley Library, MB1/1586).

73 PRO, ISL’s weekly meeting 16 April 1958 in ADM 205/172.

74 Hartley Library, Mountbatten to Burke 17 Feb 1959 in MB1/1586.

75 Hartley Library, Mountbatten to Burke 24 Apr 1959 (attachment) in MB1/1447.
Chapter 5: Polaris and Beyond

An open and shut case? Not quite. Mountbatten mentioned HMS *Dreadnought*, and his remarks should be seen first of all in the context of his great enthusiasm for the nuclear-powered submarine, a weapon whose revolutionary impact should not, forty years on, be underestimated. The underwater speed and endurance of the SSN, and its enhanced capability to fight other submarines, changed all the rules of anti-submarine warfare. In June 1955, within two months of Mountbatten's arrival as First Sea Lord, the Board approved an SSN project, later choosing the symbolic name *Dreadnought* for the first boat. As Crowe records, Mountbatten was “deeply impressed by the *Nautilus* and became a rallying point for all those elements in the Navy which had been unsuccessfully pressing for action.”

Grove agrees that “it was the advent of Lord Mountbatten as First Sea Lord . . . that gave the project decisive new impetus.” After numerous meetings and discussions with Burke, Rickover and other US officials Mountbatten eventually not only got the British project well and truly underway but also obtained some very cheap help with the construction of the first boat and its reactor.

Solly Zuckerman, on the other hand, recalled Mountbatten's enthusiasm for carriers distinctly overshadowing that for SSNs. In fact, as a close reading of a wide variety of his correspondence reveals, Mountbatten had an extremely large number of enthusiasms: carriers, SSNs, helicopters, Seaslug and other guided weapons, automated command and data systems, tactical nuclear weapons, the NA39 strike aircraft, tripartite UK-US-Canadian OR exchanges on Atlantic anti-submarine warfare . . . the list goes on.

To isolate the references to Polaris is to be guilty of serious selective quotation. The real key judgement is Grove’s: Mountbatten “was amenable to any scheme which stood to project the fleet into the future.” Ziegler’s conclusion that “ever since . . . 1955 . . . Mountbatten had dreamed of the day when Britain’s deterrent would depend not on land-based missiles or the RAF’s bombers but on the efforts of the Royal Navy” is overstated – or rather, no less true of a dozen other technological dainties which caught his eye down the years.

The Mountbatten-Burke correspondence should, in any case, be treated with a certain amount of caution. Few of the letters can have been drafted personally, and almost all were circulated in extract form around the staff divisions of the Admiralty. Both Mountbatten and Burke were writing for their audience with one eye on the main chance. Mountbatten’s eulogy on Polaris in April 1959, for example, prefaced a request for drawings of the *George Washington*, important

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76 Crowe, ‘Policy Roots,’ p.256 (*Nautilus* was the US Navy’s first SSN).
77 Grove, *Vanguard to Trident*, pp.230-3.
78 Zuckerman, *Monkeys, Men and Missiles*, p.266.
79 See e.g., on helicopters Ziegler, *Mountbatten*, p.531; on tactical nuclear weapons, at least in 1957-59, correspondence in Hartley Library, MB1/1586; on automated systems, Mountbatten to Burke 24 Feb, 2 Apr 1958 and others in MB1/447; on tripartite OR, Mountbatten to Burke 20 May, 6 Aug, 2 Sep 1958 and others in *ibid.* and PRO, ADM 205/179; on missiles and NA39, First Sea Lord’s newsletter 29 Sep 1958 in ADM 205/172.
80 Grove, *Vanguard to Trident*, p.256.
The Royal Navy and Nuclear Weapons

given the pressures on draughtsman manpower in the UK. His view of the US relationship was realistic: his carefully cultivated friendships with such as Burke and Rickover were a means to the end of UK capabilities on the cheap. A similar sentiment drove his actions over the SSN, and also in the field of surface to air guided weapons. There is little in this to arouse suspicion. Certainly Mountbatten was an opportunist, rather than a profound or original thinker. Certainly too he was a fixer, with a preference for underhand methods, not averse to buttering up his contacts but ready to cut his losses if necessary. His mind could change over the years, as it seems later to have done under Zuckerman's influence over tactical and ultimately strategic nuclear weapons. Often he sought genuinely to keep his options open. I believe it would be wrong therefore to read into the years 1955-62 a sinister or even a single-minded pursuit by Mountbatten of the Polaris option. Instead, it seems more plausible to suggest that the system was only one of a range of enthusiasms which were pursued off and on, always up the sleeve, but eventually adopted not by force of will but by force of circumstance at the political level.

Putting Polaris into service

The story of the Nassau summit meeting just before Christmas 1962, at which Kennedy was forced to offer Polaris to Macmillan, effectively without strings, has been told a number of times. Macmillan by all accounts gave a virtuoso performance; Ambassador Ormsby-Gore had skilfully prepared the ground in advance; Kennedy, for all his interest in promoting a European defence solution based around the MLF, could not but give way. Macmillan's government might have fallen without Polaris, and the US cannot have relished the possibility of its replacement by a unilateralist Labour, or Gaullist Conservative, administration. The Royal Navy was faced, for all its misgivings, with the need to undertake a Polaris programme, and professional pride dictated that this be achieved speedily and with the minimum of fuss. "What was quite certain . . . was that the general reputation of the Service was now at stake and involved in the successful creation of the Polaris force." Many of the project papers remain classified: in particular, we cannot expect details to emerge for some time to come of the operation, operational performance and command and control of the boats. Nevertheless the broad lines of the story are clear. The details had been under consideration for a number of

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82 See e.g., Hartley Library, note of 21 Jul 1955 on Blue Slug cancellation and possibility of taking advantage of US R&D instead, in MB1/1586; PRO, 1SL's weekly meeting of 11 Sep 1958 on possibility of getting the Terrier warhead for Seaslug, in ADM 205/172.

83 See e.g., Ziegler, Mountbatten, pp.528, 701.

84 Zuckerman, *Monkeys, Men and Missiles*, ch.24-25 are interesting in this regard.


87 ADM 1/27564 'Polaris submarines: strategic communications 1959-60' and ADM 1/28988 'HMS Resolution radio and communications 1963-4' remain closed; also the various other papers in the block ADM 1/28968-92 (mentioned in PRO class list).
years, but real decisions only began to be made in 1963. A high-level mission including Zuckerman, VCNS Varyl Begg, Chief of the Polaris Executive Mackenzie, Mackay and other leading Admiralty, MoD and Ministry of Aviation officials visited the US in January 1963 for detailed discussions, reporting back on their return. The mission recommended copying US designs and operational concepts as closely as possible for simplicity and speed: "identicality was one of the keys to a speedy transfer of information and assistance." In particular, four or five boats each with sixteen missiles, as in the American design, were preferred to a larger number of boats of a new design with fewer missiles. In addition, the mission advised that the longer-range A-3 missile should be procured for a more credible deterrent further into the future, a decision confirmed at the political level in June.

By the end of February an ACNS-chaired Polaris committee within the Admiralty had decided on a shore base for Polaris, as opposed to a depot ship. Sites at Devonport, Rosyth, Loch Alsh, Invergordon and Falmouth were considered, but Faslane, close to the US base now established at Holy Loch, soon emerged as the front runner. The choice was interesting. Dictated by entirely sensible concerns—the proximity of deep water and open sea, but not large centres of (English) population—it was nevertheless somewhat symbolic of the SSBNs' distance from the hearts and minds of the rest of the Navy. Polaris officers did not have the same qualities as their carrier and even SSN counterparts, and tended to be out of the mainstream career path. Wells describes the "tight enclave" of Faslane: "a pity . . . that the rest of the Navy saw so little of their activities." Further anecdotal evidence of naval reluctance to accept Polaris wholeheartedly is provided by Nailor. During 1964, for example, fears that the SSBN and SSN programmes would conflict seemed to be justified when work on HMS Warspite was nearly suspended. "It is difficult to generalise accurately, but it is possible to identify a strong current of feeling, particularly among senior officers but by no means limited to the Flag List, that Polaris was 'a frightful chore'." Denis Healey recalled that on Labour's return to power in 1964 some senior naval officers were expecting, even encouraging him to cancel Polaris:

The Navy told me that, though the hulls of two Polaris submarines were already laid down and long-lead items had been ordered for two more, it would still be possible to convert them into hunter-killer submarines at no additional cost. Moreover most of the senior admirals were reluctant to take on the Polaris force within their existing budget at the expense of other ships . . . When I gave [Harold] Wilson and Gordon Walker this unexpected news they asked me not to let other members of the Cabinet know; Wilson wanted to justify continuing the Polaris force on the grounds that it was 'past the point of no return'.

88 The following account relies heavily on Nailor, The Nassau Connection. The report in question is preserved in ADM 205/212.
89 Nailor, The Nassau Connection, p.16.
Paradoxically, the Navy appears to have campaigned, on strict grounds of operational convenience, for a fifth Polaris boat to be built. Mountbatten and Mackenzie both came to regard the fifth boat as necessary, and the Cabinet decided in February 1964 to go ahead on this basis. The decision was reversed a year later at a political level. Four Polaris submarines were therefore built by Vickers in Barrow and Cammell Laird in Birkenhead between 1964 and 1969, each equipped with sixteen Polaris A-3 missiles. The US Navy provided considerable help with submarine construction; the missiles, minus warheads, were purchased directly. The re-entry vehicles and warheads were, at least in theory, a British design and certainly built at Aldermaston, although American assistance to this establishment was now extensive and it is clear that the design of the US W-58 warhead was made available to be copied. The missiles were targeted by SACEUR as part of a coordinated NATO nuclear war plan; or rather, this was the normal posture. The 'supreme national interests' clause agreed at Nassau meant that Polaris could alternatively be targeted as part of a national plan against a small number of Soviet cities—above all, Moscow. Moves made between 1959 and 1962 away from V-bomber counterforce targeting and towards a criterion of minimum damage, based on a small number of cities, had already played a considerable part in making Polaris acceptable to the more strategically minded of the government's advisers. Thus the British moved closer to Arleigh Burke's strategic concept, although still seemingly without an energetic naval push behind the evolutionary changes in targeting or strategic concept. Although authority for nuclear operations could in theory be given only by the Prime Minister, it is clear that Polaris submarine commanders were physically capable of launching missiles themselves. Target information was held aboard the missile, but could be changed by the insertion of new cards or tapes, or possibly by manually keying new coordinates into a computer. Communication with the submarines, generally assumed to have been patrolling undetected in slow circles somewhere in the North Atlantic, was by VLF radio, sites near Rugby and later elsewhere being used to transmit messages.

The possibility of using Polaris outside the NATO area has already been mentioned; one of the advantages of the submarine over a ground-based system, perceived as early as 1958, was the ability to attack China as well as Russia. In January 1960 the possibility of the Royal Navy's basing a small number of submarines East of Suez, to complement the large US fleet in the North Atlantic,


94 PRO, Cook to CDS of 5 Apr 1967 in DEFE 25/123.


96 See Gregory, *Nuclear Command and Control in NATO*, ch.4; also PRO, Zuckerman to Thorneycroft S/29/63 of 15 Jan 1963 in ADM 205/213.
was again canvassed in discussion of the first BNDSG report. In 1963, the objective was to get a Polaris project up and running as quickly as possible, and it was decided to put off a decision on this basing option whilst preserving "an inherent capability to operate East of Suez if that should subsequently prove to be desirable." Two years later, a similar 'wait and see' decision was made, this time to equip a new Far East submarine depot ship 'for but not with' Polaris support facilities. Discussions also took place on the possibility of freighting Polaris missiles to the Far East. By early 1966 a decision could not be put off much longer, and the Chiefs commissioned a paper on the detailed implications of an East of Suez option. At this stage a number of practical problems could be foreseen. A shore base or depot ship would certainly be necessary, together with a floating dock, although the King George V graving dock at Singapore might take one of the submarines in an emergency. Communications facilities would be needed, probably by agreement with the US, which was building a VLF facility in Western Australia; navigational aids and survey work would also be required in the Indian Ocean. Options for building up base facilities were listed as Singapore, Fremantle, an Indian Ocean island or even, provided an agreement could be reached with the US, Guam; patrol patterns for firing areas in the Arabian Sea and Bay of Bengal were considered. As the paper noted, however, the real problems were political rather than practical: the Polaris force was committed to NATO by the Nassau Agreement, and there might be severe political difficulties in establishing an overseas base from which SSBNs could operate. New Zealand and Ceylon had already expressed unease at the possible presence of nuclear-armed ships in their waters.

We should not, however, be surprised at the serious consideration being given to basing Polaris East of Suez. As Pierre notes, the Labour government set great store in particular by its relationship with India, and in the months after the first Chinese atomic test in 1964 the possibility of a nuclear guarantee to India was openly discussed even at heads of government level. To some extent at least a guarantee to India was seen as an anti-proliferation measure; it should also be seen as an extension of the limited nuclear war strategy developed by the Chiefs and JPS in 1960-61, as a result of which V-bombers and nuclear-capable carriers found themselves operating in the Far East. Although the argument is highly questionable, some at least in the government felt that these nuclear deployments had been useful in deterring Indonesian escalation of the 'confrontation.' The offer of an East of

97 PRO, CDS brief of 22 Jan 1960 in DEFE 25/13; MoD brief of same date in DEFE 7/2278.
102 See PRO, note of Secretary of State's mtg 8 Jun 1967 in DEFE 11/437. V-bombers operated from Singapore and Malaysia between 1957 and 1966 (Brookes, V-Force, pp.137-40); nuclear weapons were taken to the Far East, perhaps initially in Nov 1960 (report on trial flight of Red Beard to Singapore dated 8 Nov 1960 in AIR 2/13737; also correspondence here and in AIR 2/13774 on facilities in the Far East). Carriers with Red Beard also operated in the Far East from 1960 (see above ch.3).
Suez nuclear umbrella perhaps therefore had more to do with British than with Indian security preoccupations, and as such it had little appeal in New Delhi, where the decision to develop an indigenous nuclear weapons capability had been taken in the uncertain political conditions following Nehru's death.\textsuperscript{103} Nor did these discussions have much to do with Royal Navy preoccupations. Although it is harder to discern a distinctively naval train of thought in Whitehall documents emanating from the centralised Ministry of Defence after 1964, it seems clear that most of the detailed work on Polaris basing options will have been done by naval officers and former Admiralty officials. The 1966 Chiefs report, like earlier Polaris studies in 1958-60, was careful to reserve judgement on political and expenditure issues. But low level studies within the competence of the naval authorities already assumed that no Polaris force would ever in fact operate East of Suez.\textsuperscript{104} Although the possibility remained as late as 1970, British defence policy-makers were now conscious that the entire East of Suez commitment was questionable in the long term, and the idea was put off at the end of 1967 for a rolling three years.\textsuperscript{105} The decision had already been made earlier in the year not to pursue the possibility of replacing Polaris with the new generation American system Poseidon, a decision which sowed the seeds of the monstrously expensive Chevaline programme, but which set fair British strategic nuclear weapons policy for many years to come.\textsuperscript{106}

Nuclear anti-submarine warfare (II)

To round off the story of naval nuclear weapons development elegantly, I should like to be able to give an authoritative account of how tactical weapons policy too became set fair at the end of the 1960s. This remains a little difficult. Lacking the political glitter of strategic weapons policy, the subject is somewhat obscure and has not received the same attention in the memoirs and secondary literature.\textsuperscript{107} Nevertheless it is clear that the second-generation tactical nuclear bomb WE177

\textsuperscript{103} See Pierre, Nuclear Politics, pp.286-7; Bhatia, India's Nuclear Bomb; Kapur, India's Nuclear Option; also papers in PRO, DEFE 25/107 and 123, which suggest that India's objection was to a UK only guarantee, which the US and USSR refused to underwrite.

\textsuperscript{104} A proposal to fit air conditioning aboard the Polaris missile freighter RFA Fort Langley, though necessary for safe handling of the missiles East of Suez, was rejected by the Admiralty Board in April 1966; see papers in PRO, ADM 1/28354.

\textsuperscript{105} See correspondence on a revised submission to the Chiefs in October 1967 in PRO, DEFE 11/437 and outline of decision in DUS(P) draft of 5 Jun 1968 in DEFE 25/107; papers in DEFE 24/504 and 505, still classified, carry the story up to 1970 (see PRO class list).

\textsuperscript{106} The story of the British decision not to procure Poseidon has not yet been told, although some papers on the subject are now available, e.g., in PRO, DEFE 11/437. The decision was a political one relating to Anglo-American relations, the future of AWRE, ABM research and arms control issues. For some basic facts, see House of Commons debates Vol.747, written answers col.223-4; Pierre, Nuclear Politics, pp.294-5; Healey, The Time of My Life, p.313; Grove, Vanguard to Trident, p.347.

\textsuperscript{107} Note e.g., that in late 1967 when discussions of Poseidon, AWRE and Polaris East of Suez were at their most complex, officials decided not to burden ministers with details of tactical nuclear weapons since these were peripheral to the debate: see PRO, SCDS(N/F) to VCDS of 21 Aug 1967 in DEFE 25/107.
was planned and built during the 1960s, and that it came eventually to be carried by a variety of Royal Navy aircraft for use against ships, shore targets and submarines. As with Polaris, this implies a certain shift in attitudes during the decade. In particular, although a tactical atomic bomb had already been deployed by the Royal Navy in the shape of Red Beard, we left the story of anti-submarine nuclear weapons in chapters three and four with the Admiralty still distinctly ambivalent, for a number of reasons.

RAF Coastal Command began during 1960 and 1961 however to draw up concrete plans to equip Shackleton maritime patrol aircraft with US Mk.101 (Lulu) nuclear depth bombs (NDBs), which by 1965 were expected within a year. As with other US nuclear weapons, the Admiralty will have found that practical issues of storage and custody made their deployment on Royal Navy ships impossible. A DOR study in 1962 concluded, moreover, that the NDB offered few advantages over new US Mk.46 torpedoes, and the Board refused to commit funds to any NDB development.

Royal Navy anti-submarine capabilities remained far from ideal however. As early as 1958 it had been recognised that new long-range sonar equipment then under development would highlight gaps in weapons technology. By 1961 it was clear for example that although the Type 2001 sonar on hunter-killer SSNs could detect other submarines at ranges of up to 36nmi, the best torpedo in prospect, the wire-guided Ongar, could manage only 7½nmi. This was a serious mismatch. Worse, developments in submarine quietening were driving a move away from passive and towards active sonar detection. Whilst perfectly within the Type 2001’s capability, this would give away the hunting submarine’s position to the hunted, and a weapon with a much faster response time than a conventional torpedo would be required in order to prosecute an attack with any safety. On this basis, FOS(M) began to press for the procurement of SUBROC, an American weapon which, although fired from a submarine, flew above the water for most of its journey to the target, at far greater speed than any torpedo could achieve. There was a problem with SUBROC, however: it existed only in a nuclear-tipped version. By 1964 it was decided that, since political authority for the use of anti-submarine nuclear weapons could not be assumed in limited war, SUBROC would be useless in most circumstances: “the Royal Navy is not prepared to buy so expensive a weapon so long as it has no conventional capability.” The conventionally-armed Ikara missile and the MATCH helicopter, later the Westland Wasp, were pursued instead.

A year later the Kendrew Panel on Research and Development for Anti-Submarine Warfare, set up within the MoD under Deputy Chief Scientific Adviser

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110 PRO, DRP/P(58)10 of 31 Jan 1958 in DEFE 10/278; papers in docket MI/616/9/61 ‘Armament of Future Submarines’ in ADM 1/27978.

111 PRO, papers in ADM 1/28884; ASWWP report of Oct 1964, ch.9, in DEFE 24/132.
Dr J C (later Sir John) Kendrew, summarised its conclusions on anti-submarine nuclear weapons thus:

Lacking official guidance we have assumed that our forces use neither nuclear depth charges nor torpedoes with atomic warheads. We understand that it is sometimes argued that nuclear weapons could be used in naval actions with little risk of an uncontrolled spread of the conflict. We, however, have taken the contrary assumption that our forces would not be at liberty to use nuclear weapons.\textsuperscript{112}

By the end of 1965, however, the Navy's views may have begun to change. In a paper for the Chiefs on the carriage of nuclear weapons aboard ship it was stated simply that "present plans envisage the introduction of nuclear anti-submarine weapons from 1969 onwards."\textsuperscript{113} The Future Fleet Working Party report, issued the following September, was more circumspect, confirming that a nuclear payload was under consideration for large anti-submarine aircraft, helicopters and Ikara but noting that "Government policy on NDB is still uncertain."\textsuperscript{114}

Planning for a Red Beard replacement had begun as early as 1959, although at least initially it was just a retarded kiloton-range bomb for use by low-flying aircraft, and discussed quite separately from anti-submarine weapons.\textsuperscript{115} This project became WE177. It seems likely that an underwater fuzing option was only suggested later, either by Coastal Command, to supplement its American NDBs, or possibly, for the limited war role, by the Admiralty. The first reference I have found to an anti-submarine version of WE177 dates from 1962, but at this stage, as we have seen, the Board of Admiralty was refusing to commit to any NDB development.\textsuperscript{116} As with the original Red Beard, Admiralty and Air Ministry ideas of the new weapon seem to have become somewhat different. After the Polaris decision had been taken, the RAF pushed through an urgent requirement for a high-yield bomb for low-level use by V-bombers and later TSR.2, as a way to extend the useful life of the airborne deterrent force.\textsuperscript{117} The WE177b was designed to meet this requirement and entered service in 1966. An initial expression of naval interest in this high-yield bomb for use against strategic targets seems not to have been followed up seriously.\textsuperscript{118} Instead, the Navy wanted a lower-yield version as a more

\textsuperscript{112} PRO, DR/P(65)26 of 29 Apr 1965 in DEFE 10/572.

\textsuperscript{113} PRO, COS.210/65 of 10 Dec 1965 in DEFE 5/164; COS.14/66 of 28 Jan 1966 in DEFE 5/165.

\textsuperscript{114} PRO, FFWP Report Vol. 2 Annex U2, esp pp.U2-5, U2-8, in DEFE 24/238. The Navy had prepared a policy paper on tactical nuclear weapons, NFPS 9/64, in August, but I have been unable to locate a copy (see papers in DEFE 24/293).

\textsuperscript{115} See e.g., PRO, notes of DA Arm mtg 8 Dec 1959 in AVIA 65/1166. The first issue of OR.1177 (for the later WE177) was dated 30 May 1960 (covering note in AIR 2/13735).

\textsuperscript{116} PRO, AWRE brief of 17 Jul 1962 in AVIA 65/1836 and refs in footnote 109.

\textsuperscript{117} See papers in PRO, DEFE 25/23.

\textsuperscript{118} Wynn, \textit{RAF Strategic Nuclear Deterrent Forces}, pp.461-3; Carrington (First Lord) to Minister of Defence, 21 Jan 1963, in DEFE 25/23.
or less straight swap for Red Beard, but capable of use as an NDB; this became WE177a, but took a lower priority. In December 1966, WE177a was listed as a payload option for the Wessex Mk.3 or Sea King anti-submarine helicopters to be carried by the Tiger-class helicopter cruisers, which had been approved in 1964. In August 1967, it was stated that "a nuclear depth bomb is being developed for the Royal Navy for use against submarines." The Wessex Mk.3 was the first Fleet Air Arm aircraft with the capacity to carry both a dipping sonar and a weapons payload including the NDB, and the Sea King was considered important for its range and endurance, allowing a much fuller prosecution of possible submarine contacts. Wessex Mk.3s entered squadron service with the Fleet Air Arm in 1968, going to sea with HMS Blake in 1969. Sea Kings were embarked on HMS Ark Royal in 1970, and on HMS Tiger in 1972. It is difficult to say at which point WE177a was actually delivered. Paul Jackson suggests that the basic bomb entered service on Buccaneers in 1969, followed by the NDB in 1971. It is likely that by this date the Royal Navy had a nuclear anti-submarine capability.

What had changed since the distinctly ambivalent noises from the Admiralty in 1960? Without more detailed evidence, and in particular a final date for the authorisation of a WE177a anti-submarine version, it is difficult to account for the change with any finality. It is possible to speculate, however, that continued problems with conventional anti-submarine weapons, especially new homing torpedoes, were partly to blame for the Royal Navy's turning to a nuclear solution. Postwar British torpedo development is rather a sorry story. A number of extremely protracted projects delivered weapons by the mid-1960s including the submarine-launched Mk.20 (formerly Bidder-S) and Mk.23 (Grog), and the air-launched Mk.30. Other developments, including a version of the Mk.20 for use from surface ships, had very short service lives and still others, including the air-launched Mk.31, were cancelled.

During the Falklands War of 1982, the captain

119 The WE177a's ballistic case was undergoing trials by the end of 1965; see photograph in Laming, Buccaneer, p.42. Some writers have suggested that the WE177c was the Navy's version of the weapon (e.g., Norris, Burrows and Fieldhouse, British, French and Chinese Nuclear Weapons, pp.65, 129), but the available documents do not support this idea.


122 Jackson, 'Bin the Bomb' in RAF Yearbook 1999, p.22. Aircraft service dates from Thetford, British Naval Aircraft since 1912, Williams, Fly Navy: Aircraft of the Fleet Air Arm since 1945. Cook, in Jane's Defence Weekly 18 Jul 1992, agrees with a date of 1971. It may be wrong however to assume that the NDB entered service in any particular year just because the Sea King did so; there was a two year gap, for example, between Scimitar and Red Beard service entry (1958 and 1960). Harry Pout, ACSA(P) between 1965-69, recalls no firm decision to go ahead with an NDB version of WE177 during his time at the MoD (pers. comm. 5 Jun 1999), and if this is the case the weapon may not have gone to sea operationally until 1973 or later.

123 See Kirby, 'A History of the Torpedo. Pt.4' in Journal of the Royal Naval Scientific Service 27/2 (Mar 1972), pp.87-105; Preston's 'From Fancy to Stingray: British
of HMS Conqueror famously distrusted his postwar torpedoes to such an extent that he used two weapons of a wartime design, the Mk.8, to sink the General Belgrano. These problems should not necessarily be overstated however. Anti-submarine warfare has never been easy, but by 1963 the sonar range mismatch problem had been solved, at least to some extent, after the entry into service of the Wasp helicopter, armed, like its larger cousins aboard aircraft carriers, with the American Mk.44 torpedo. The more advanced Mk.46 was already anticipated, and entered service in 1970. The Ikara missile went to sea with the Royal Australian Navy in 1964, and also entered service with the Royal Navy in the early 1970s. Even the submarine-launched torpedo Ongar, though delayed, still showed promise. The NDB was only one amongst a number of anti-submarine weapons developments in these years therefore, and there seems to have been no outright despair at lack of progress with the others. There was also a definite concern to avoid a “nuclear or nothing dilemma.”

On the other hand, views on the NDB’s potential against fast and deep-diving targets may have been changing. The first generation of Soviet nuclear-powered submarines, Projects 627, 645 and 675 (‘November’ and ‘Echo’ classes), were already in service in some numbers by the mid-1960s, but they were noisy and their performance was no better than that of Western SSNs. The Project 670 and 671 (‘Charlie-I’ and ‘Victor-I’) boats coming into service after 1967 offered some improvement, but the Project 661 and 705 (‘Papa’ and ‘Alfa’) designs, laid down around 1964, were revolutionary. These titanium-hulled boats could dive to 500m and were capable of over 40kt; the Project 661, in fact, still holds the world speed record for a submarine. Both were perfectly capable of outrunning contemporary Western torpedoes. The date and extent of British intelligence of these submarines is unknown, and planners may simply have extrapolated from existing trends in submarine performance, without having obtained specific knowledge of 1970s threats. Tactical problems remained, and nuclear weapons in service brought tiresome problems of handling and form-filling. Nevertheless, it may now have been thought that an NDB, carried by an aircraft, offered the best combination of closing speed and lethal radius, and therefore the best chance of destroying an SSN. Certainly the growing numbers of Soviet submarines, and the falling number of Royal Navy ships and RAF maritime patrol aircraft, seem if nothing else to have pointed to the importance of the NDB as a force multiplier.

Finally, the opportunity also came towards the end of the 1960s to challenge existing strategic assumptions on the use of nuclear weapons in a war at sea. The East of Suez justification for the Royal Navy’s Red Beard atomic bombs, and much else, was destroyed by the 1966 decision to phase out the carrier force. During 1967, the possibility of handing over at least some naval nuclear weapons to the RAF was considered. The possibility of nuclear use in a limited war outside

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126 See e.g., PRO, manuscript addition to ACAS(Pol) note of 19 May 1967 in DEFE 24/293; also A/ACAS(Ops) draft of 30 Aug 1967 in DEFE 25/107.
Europe had always been questionable, but the Navy, in line with the rest of the British defence community, now turned its attention back towards Europe. Here, the Soviet Navy was making its first forays into blue water.

Although I noted in the previous chapter a reluctance in British naval circles to contemplate a nuclear campaign against the Soviet Navy, Arleigh Burke had begun studies of limited maritime nuclear options after the Berlin crisis of 1959; Paul Nitze, Secretary of the Navy from 1963, began his own ‘War at Sea’ studies. These included by 1967 an Atlantic Fleet operational plan, Oplan 2300, for a scenario in which the US response to Soviet aggression was to be short of strategic nuclear attack but could extend right up to “the entire Atlantic Fleet in a complete confrontation with Soviet forces at sea.”

As the decade went on, discussions in NATO leading up to the formal adoption of the ‘flexible response’ doctrine in 1967 revolved more and more around the problem of tactical nuclear weapons. Solly Zuckerman, a tireless campaigner against the very concept of tactical nuclear warfare, left the Ministry of Defence in 1966 and, although remaining the government’s Chief Scientific Adviser, lost influence over defence policy issues. In the same year, an international NATO Nuclear Planning Group (NPG) was set up specifically to study options for the flexible use of nuclear weapons. An NPG meeting in The Hague in April 1968 called for a series of studies, one of which, on nuclear weapons at sea, was to be contributed by the British; by September Denis Healey was personally revising this paper. The Navy did not simply reverse its earlier position on the ‘western desert’ idea of nuclear war at sea. Contributors to the Naval Review, for example, continued to reject the idea:

I find unbelievable the idea of a ‘Totally Wet War’ – that is, an all-out assault on Western shipping worldwide over a protracted period and unconnected with war on land . . . if it neared success the slowly-building situation would be tailor-made for nuclear response.

On the other hand, the need to produce studies for the NPG will have resulted in pressure to revisit the question and to produce thoughts and options, including nuclear options. In 1969 the Healey-Schroeder report, jointly produced by the British and German defence ministers, summarised these studies and produced options for limited and extended use of nuclear weapons in a European war, including “maritime use.” This led in December 1969 to the adoption by the alliance of ‘Provisional Political Guidelines’ on nuclear weapons use as part of the flexible response strategy. Towards the end of the decade a consensus was emerging on the tactical need for anti-submarine nuclear weapons, given the

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128 KCL Archive, US Nuclear History, MFF16/01031, 01037, 01038 and 01040 contain State Department telegrams on the early deliberations of the NPG.


130 Bluth, Britain, Germany and Western Nuclear Strategy, pp.185-6; Haftendorn, NATO and the Nuclear Revolution, pp.166-73.
performance to be expected from the next generation of Soviet SSNs. The Royal Navy gradually joined this consensus. Documents on the NPG’s deliberations have yet to be declassified in the UK, but it seems that political top cover for a reversal in policy was later provided by this group; later still, NDBs actually entered service. With less capital at stake – both political and financial – the new weapon’s acceptance seems to have been painless compared to Polaris. As the 1970s dawned, the Royal Navy had finally accepted a role in nuclear warfare and a substantial nuclear capability, some twenty-five years after the explosion of the first atomic bomb.
A Royal Navy Polaris test round in flight. Unlike the US Navy, the Royal Navy has never tested a live Polaris complete with warhead. The missile is painted black and white to assist telemetry cameras in pinpointing its position; it is not clear what colours adorned the missiles in real life.
Fig. 24: Arleigh Burke

US Chief of Naval Operations between 1955 and 1961, Burke not only championed Polaris and encouraged the development of the 'finite deterrence' strategy which assured its success in the US, but also corresponded frequently with Mountbatten. The influence he exerted in the UK was perhaps considerable, although there were also important differences in outlook between the US and Royal Navies, including on nuclear issues (pp. 157-62, 171-3, 190-1).
The second generation British tactical nuclear weapon WE177 was produced in a number of versions in the late 1960s. The naval WE177a could be used as a free-fall bomb or NDB; the RAF's WE177b and c were higher-yield weapons of greater size (pp.179-81; Jackson, 'Bin the Bomb')
Conclusions

An occasional reader may feel that more detailed description should have been given of the experiments and calculations upon which these theories rest. Let him reflect, however, that a volume so elaborate would take longer to read and cost more to buy.

(C Northcote Parkinson, Parkinson’s Law)

The story of British thinking about nuclear weapons is a complex one, and even by concentrating attention upon the Royal Navy it has been impossible to eliminate this complexity altogether. I have covered, at relatively high speed, about twenty-five years of the postwar period by extracting some of the more important strands of thought about the defensive and offensive, tactical and strategic implications of nuclear weapons, jumping forwards and backwards in time as convenient and skipping, as a result, large areas of naval and nuclear history. A little more synthesis is still required, however, before coming to some preliminary conclusions about the Royal Navy and nuclear weapons. In these few pages I shall attempt to construct a brief but coherent narrative, before comparing other navies’ experiences of nuclear weapons, and considering wider issues of change and continuity and the process of military technological innovation.

I have repeatedly stressed that the Royal Navy’s reaction to nuclear weapons was sceptical, unenthusiastic and based on practical considerations, with a leavening of prejudices built up through the experience of defence policy-making and actual warfare at sea, especially during the twentieth century. Had nuclear weapons changed the face of war forever? On careful consideration, few in the Royal Navy thought so. Initial apocalyptic visions in 1945 quickly gave way to efforts to make sense of nuclear weapons in the context of naval warfare during the Second World War. Roskill’s report of the Bikini atom bomb tests, with its focus on real world scenarios – a fleet at sea, an amphibious landing, a convoy – is an excellent example. This practical reaction was understandable amongst men who had not simply lived through the trauma of six years of war but had emerged successful, largely through improvisation and flexibility. Organisationally, meanwhile, the British defence community was fragmented, and the Admiralty and Royal Navy were free, in the absence of an effective agenda from the centre, to consider the atom’s place in naval warfare and not vice versa. It was clear nevertheless that even if the defence of trade at sea was unlikely to involve the large scale use of atomic weapons, British supply lines had become acutely vulnerable at their end points in British ports. A great deal of thought in the Admiralty and elsewhere went therefore into ‘broken-backed warfare’ and the problems of emergency ports, dispersal, coastal defence and control of shipping. A large construction and modernisation programme was put in hand during the Korean War and a global war navy of escorts and minesweepers was begun, much of it dispersed in reserve around minor ports and anchorages. This remained for some years the dominant theme in naval planning for global war, and was endorsed by the Chiefs in
the 1952 Global Strategy Paper, a document recently much hyped by historians but which in effect merely codified the existing policies of the three services.

The potential of offensive carrier operations was another Second World War lesson which gained adherents postwar, especially under the influence of the US Navy's NATO Striking Fleet concept. This did not however lead the Admiralty to bid for a part in the strategic air offensive:

The Sea Lords had concurred wholeheartedly in the development of atomic weapons, but at the same time had made no attempt to participate in the delivery of the deterrent. Tradition, experience and lack of funds all predisposed the Admiralty against seriously attempting to claim a strategic bombing role for the Fleet Air Arm.1

The ideas of broken-backed warfare and offensive carrier air were both revitalised, after the H-bomb became common knowledge and Churchill's Cabinet rubber-stamped its development in the UK, by McGrigor's Review of Naval Policy. During the mid-1950s, however, central control over service policy-making began at last to be exerted. No longer could the Chiefs set policy by cosy compromise. Instead the post-Korean economies in defence and then the post-Suez reappraisal, leading in short order to the Sandy's White Paper, meant that clearer choices had to be made. In the new climate, the further refinement of the broken-backed warfare strategy that would have been necessary to meet the threat of thermonuclear warfare was financially out of the question, even if it had been practical. The Admiralty complained for several years that its commitment to protect supplies arriving in these islands by sea, even in the grim 'survival phase,' should either be funded or formally renounced, but the global war navy was effectively dead, and indeed by 1961 the Navy would argue that NATO strategy should be changed to reflect this new reality.

In 1957 Sputnik was launched and this more than anything made it clear to a wide constituency that both superpowers were now vulnerable to nuclear attack. Two responses were possible. Sandys and the RAF attempted to head off vulnerability by the application of new technology. Ballistic missiles, a V-bomber alert force at dispersed airfields, stand-off weapons, nuclear-tipped SAGW to protect Bomber Command, ABM research and other paraphernalia of the arms race were planned. It became clear in only a couple of years that this would prove ruinously expensive, although this argument failed, and would continue to fail, to prevent the further development of a baroque nuclear arsenal in the US. The Navy, and many civilian strategists, including that prophet of common sense Patrick Blackett, meanwhile saw through this thicket of technological trees to the wood of nuclear sufficiency. In practice, nuclear weapons would continue to deter major war, but other defence preparations would be more likely to prove militarily useful: "I think I am quite orthodox in holding that H-bombs are so powerful that they could not be used against another H-bomb power by any nation that wanted to survive."2 Revealingly, in reviewing Blackett's work for the Naval Review, Roskill skipped over nuclear strategy and concentrated on Blackett's role in wartime


operations research — a matter "of more direct concern to readers of this journal."

Indeed the Navy paid singularly little attention to the abundant academic and US strategy of nuclear war, ignoring even those ideas adopted specifically by Arleigh Burke to support a naval agenda. Instead Mountbatten and others pressed the 'nuclear sufficiency' line for a number of years, encouraged by Admiralty civil servant James Mackay, one of the unsung contributors to British nuclear policy. Whilst the politicians would never endorse this line explicitly — the 'independent' deterrent was far too important a political issue — they did allow the Royal Navy in practice to develop an East of Suez justification for a conventional balanced fleet.

Most of the existing work on postwar British defence policy has failed to recognise the seriousness of preparations for broken-backed warfare, and has tended to deny the intellectual respectability of nuclear sufficiency and extra-European limited war, preferring to concentrate upon the nuclear strategies and deterrent systems of the RAF and other modernisers. The Royal Navy did continue to develop the latest technology, including SSNs and guided weapons, and considered developing nuclear weapons for a number of roles. It is striking however that the arguments advanced in their favour were tactical rather than strategic: they did not betoken enthusiasm for nuclear warfare, or, in particular, for naval involvement in strategic bombing or nuclear warfare on land. The need for a reliable one-shot Sverdlov-killer led to naval involvement in the Red Beard programme, although this took so long to come to fruition that a limited war against China or Indonesia was a more realistic practical application by the time the weapon was deployed. The need to take part in NATO exercising was another reason to continue with Red Beard, although British and American conceptions of the Striking Fleet were always rather different. Towards the end of the 1960s, it also became clear that the need for a reliable SSN-killing weapon meant a requirement for a naval nuclear depth bomb. A certain amount of political pressure arising from the need for practical refinement of the NATO flexible response doctrine may have begun in 1968 to contribute to this conclusion, although fuller knowledge of this train of thought must await the release of papers on the maritime war studies of the Nuclear Planning Group. Meanwhile Polaris had also been procured, although hopefully chapter five will have suggested strongly enough that this Royal Navy acceptance of responsibility for deploying strategic nuclear weapons came against the run of play.

Nuclear weapons and other navies

For the superpower navies, by contrast, nuclear weapons assumed appreciably greater importance in the postwar period. The Royal Navy was by the end of the Second World War appreciably inferior to the US Navy; by the end of the 1960s its declining commitment to worldwide deployment, the cancellation of its carriers and its numerical inferiority compared to the Soviet long-range submarine fleet probably took it down another place to number three in the international naval pecking order. It could still measure itself realistically, however, against US and Soviet yardsticks and it will be interesting briefly to examine these navies' perspectives on nuclear weapons and to consider the extent to which they influenced the Royal Navy. The
French had also, by 1970, equipped the Marine Nationale with nuclear weapons, but there is a great deal less published work on French postwar naval history and so comparisons are difficult to make between British and French experience.

I have already touched on the US Navy’s attitudes several times; it is no accident that these references have related chiefly to the development of offensive naval nuclear weapons and strategies, notably the Striking Fleet and Polaris, and their place in a nuclear war with the Soviet Union. Nuclear weapons quickly became politically important to the US Navy after the Second World War, and ruinous public battles were fought in the late 1940s with the USAF over the Navy’s right to take part in a future strategic bombing campaign. Ultimately, although the B-36/carrier debate was lost and the United States cancelled, the US Navy carved out for itself a nuclear role in attack at source against naval targets, and the NATO Striking Fleet was formed. As early as 1950, meanwhile, the Hartwell study recommended the development of nuclear anti-submarine weapons for use in the North Atlantic. During the early 1950s, therefore, tactical atomic bombs and dedicated nuclear strike aircraft were deployed, including nuclear depth bombs from 1955. Nuclear warheads for naval use of Terrier and Talos surface-to-air missiles entered service at the end of the 1950s and nuclear torpedoes in the early 1960s; a nuclear artillery shell was even developed for the sixteen-inch guns of the Iowa-class battleships, although these were in mothballs by the time the shell was ready for service. The US Navy conducted further nuclear weapons tests at sea, including the deep underwater Wigwam explosion in 1955, two further underwater tests in the Hardtack series at Eniwetok in 1958 and the live firing of a nuclear-tipped ASROC in 1962.4 As noted in chapter five, a long series of experiments with naval strategic missiles was also conducted, leading to the deployment of Regulus and the commencement of the FBM programme in the mid-1950s. Arleigh Burke, perhaps the most influential of the US Navy’s postwar Chiefs of Naval Operations, reduced this nuclear obsession somewhat, but pitched into another very public strategic debate, pressing the idea of finite deterrence to secure the future of the FBM programme and deploying Polaris in 1960. Some US commentators have noted a distinct decline in US Navy interest in nuclear weapons thereafter; David Rosenberg goes so far as to diagnose a ‘nuclear allergy’:

Most naval officers saw the weapons as a presumably necessary evil, surrounded by a vast array of burdensome and stringent custodial and safety requirements. There were few Navy precepts on tactical and theatre nuclear warfare comparable to the army’s... no institutional impetus for top SSBN skippers to master the intricacies of nuclear targeting or operations.5

Nevertheless, during the early 1960s, Paul Nitze, as Secretary of the Navy, instituted a series of ‘War at Sea’ studies to mirror Defense Secretary McNamara’s wider search for limited nuclear options. By the end of the decade a number of operational plans had been drawn up for cases where the US response to Soviet

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aggression was to be short of strategic nuclear attack but could extend right up to "the entire Atlantic Fleet in a complete confrontation with Soviet forces at sea."6

It is possible to characterise the US Navy's influence over thinking in the Royal Navy as heavy, but inconsistent. Clearly there was a wide-ranging exchange of ideas between the two navies. The Mountbatten-Burke correspondence, for example, covers a remarkable range of subjects; the correspondence of successive Admiralty liaison officers in Washington shows a lively interest and involvement, from the Bikini trials and early experiments in tactical nuclear weapons delivery to the Holy Loch negotiations and far beyond. The Anglo-Saxon navies also shared a broadly similar cultural experience of sea power going back to Victorian times: "the US naval officer was an Anglophile because he identified with his British colleagues in every imaginable way - socially, professionally, ideologically, culturally, historically and racially."7 The exchange of ideas was also two-way, as the Royal Navy's occasionally successful influence over anti-submarine strategy in the North Atlantic shows.

There were, however, important differences in outlook, including on nuclear issues. The US Navy acquired many more nuclear weapons than the Royal Navy: hundreds, even thousands. It also advocated strategies including attack at source, finite deterrence and later limited nuclear war at sea, which at least initially held little appeal in the UK and were adopted, if at all, for political reasons. The Royal Navy rushed to acquire the SSN, the helicopter and other American technologies, but it was selective. No equivalent to Regulus was ever developed; nuclear Sealslug was dropped; nuclear torpedoes and SUBROC/ASROC projects were never begun; SSBNs were initially rejected.8 If the US Navy had a 'nuclear allergy,' how many more nasty rashes and runny noses could be found in the Royal Navy?

Wartime experience goes some way towards explaining the relative lack of enthusiasm in Britain. The grim struggle in the North Atlantic and the flexibility displayed by the Royal Navy's big ship sailors in the Mediterranean, Indian Ocean and home waters was very different to the US Navy's experience in the Pacific. There, the setback of Pearl Harbor had been followed by the unfolding of a successful programmatic strategy based around the capture of island bases, the offensive use of carriers in fleet action, the steady attrition of Japanese trade and eventually direct carrier air attack on the Japanese homeland. US confidence in a Mahanian conception of sea power was unshaken by the Second World War. Balance and flexibility were important, especially to Burke, but strategic and tactical nuclear weapons fitted more neatly into the unambiguous US experience of sweeping its opponent from the seas than into the Royal Navy's wartime strategy of improvisation. Rosenberg's comments are nevertheless interesting and significant;

8 Interestingly, the French Navy too "did not initially want nuclear ballistic-missile submarines," fearing, with justification, that these would affect expenditure on conventional naval roles - see Coutau-Begarie, 'French Naval Strategy: A Naval Power in a Continental Environment,' in Rodger, ed., Naval Power in the Twentieth Century, p.63.
at a working level, the practical lives of seaman officers in both navies were perhaps less closely affected by nuclear weapons than American strategies suggested.

In the Soviet Union, Stalin ruthlessly pursued the development of nuclear weapons from an early date, but tended to stifle any discussion of their practical military application. Recent Russian works show that theoretical studies of naval nuclear weapons began as early as 1949 and that nuclear-powered ballistic missile submarines were suggested in 1952, but it was only after Stalin’s death that these developments became of central importance to the Soviet Navy. Khrushchev, famously, regarded conventional warships as ‘floating coffins’ and from about 1955 onwards the Soviet Navy was forced to base much of its future planning on nuclear weapons, especially those carried by submarines and aircraft. Admiral Sergey Gorshkov, Commander-in-Chief from 1956, displayed his commitment to this programme for example by attending nuclear tests – no First Sea Lord ever did the same – and organising important conferences and exhibitions for Khrushchev. A new nuclear test site at Novaya Zemlya was opened for naval use in 1955, and naval tactical nuclear weapons and weapons effects experiments followed in quick succession over the next several years. Submarine-launched missiles for strategic use were brought into service in 1959, extending the USSR’s strategic reach first into Western European waters and later to the Eastern seaboard of the US. During the early 1960s, tactical nuclear weapons were introduced to extend the Soviet Union’s defensive perimeter against western carriers, and from 1968 ship-launched nuclear anti-submarine weapons were also available. Nuclear weapons appear to have been introduced by the Soviet Navy both for their political appeal, as in the US in the late 1940s, and for practical reasons of greater lethality against naval targets, as in the UK. In the USSR, there was no ‘nuclear allergy’ and no particularly glorious tradition of the conventional exercise of sea power. The adoption of naval nuclear weapons appears to have been easier as a result. Political control over the navy was also rather more ruthless than in the UK: eleven of the most senior officers in the Soviet Navy had been killed in the purges of 1937-38, and what Stalin and Khrushchev wanted, they tended to get.

Soviet conceptions of nuclear warfare appear to have had little influence over the Royal Navy. Not much information on postwar British intelligence has yet been published, but it is clear at the very least that Soviet strategy, if it was understood at all within the British defence community, could not be discussed as openly or easily as US strategy. Nor did Royal Navy officers feel any particular affinity for their Soviet counterparts. Bruce Fraser had done time in a Bolshevik prison; wartime contacts, chiefly in the context of the Arctic convoys, had been grudging and rather miserable; postwar contacts were few. Commander Crabbe’s stupid escapade, whilst not the Navy’s fault, ruined a Soviet visit to Portsmouth in

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9 See, in English, Zaloga, Target America, esp. ch.8; Holloway, Stalin and the Bomb; Friedman, ‘Soviet Union,’ in Conway’s All the World’s Fighting Ships 1947-95, pp.337-425; Polmar and Noot, Submarines of the Russian and Soviet Navies 1718-1990; Turetsky, The Introduction of Missile Systems into the Soviet Navy 1943-62; in Russian, Кузин и Никольский, Военно-Морской Флот СССР 1945-91.


11 Medvedev, Let History Judge, p.422.
1956, and Le Fanu managed to raise a smile from Admiral Gorshkov only in 1967. Nevertheless the influence of the Soviet Navy can be seen indirectly in the tactical response of the Royal Navy to the various postwar threats it faced. In particular, the naval Red Beard and WE177a were developed to counter the Sverdlov-class cruiser and the fast SSN respectively. The early deployments of Soviet SSBNs in the North Atlantic also caused headaches, this time in discussions with the US Navy, which began to consider devoting more anti-submarine warfare effort to this problem than to the SSN threat to maritime trade. The possibility of Soviet atomic attack also affected tactics and fleet and convoy dispositions at sea. Indeed, the Royal Navy could hardly have developed its tactical thinking on nuclear weapons in isolation from its views on the Soviet Navy, but it is difficult to argue that either US or Soviet political and strategic experience with naval nuclear weapons had any fundamental impact on the Royal Navy.

Change and continuity

In reviewing Royal Navy attitudes to nuclear weapons over the whole period to 1970, it is striking that even in a period of dizzying technological change and political tension a good deal of continuity is apparent. Views of the past and the lessons to be drawn therefrom went largely unchallenged until the 1970s controversy over ‘Churchill and the Admirals’ and later revisionist attempts to reinterpret the ‘Fisher revolution.’ This is unsurprising given the correspondingly slow rate of change in strategic and historical training in the Navy. Although Caspar John averred that Corbett’s influence on the Navy outweighed Callender’s by the 1930s, Edward Ashmore, First Sea Lord in the 1970s, still recalled enthusiastically from his time at Dartmouth that “academic subjects were well taught, and history lessons covered a large slice of early naval history based on Sea Kings of Britain, which we much enjoyed.”

As the table (overleaf) demonstrates, the size and shape of the Royal Navy changed surprisingly little between say 1950, when the postwar retrenchment and ship disposal programme was broadly complete, and 1970. The small reduction in active ships over a twenty year period of ‘British decline’ is rather impressive, especially given the change in overall manpower. Battleships disappeared, but this had been confidently expected. The Polaris submarines carried battleship names thereafter, but carriers were the real capital ships of the fleet. Although only HMS Ark Royal, Eagle and Hermes remained in 1970, their replacement by smaller through-deck cruisers had been assured. Conventional cruisers all but disappeared from the Royal Navy during this period, but their fleet escort role was now performed by new guided missile destroyers and their imperial policing duties were undertaken either by smaller general-purpose ships or by new and more specialised

12 Baker, Dry Ginger, pp.200-1.

13 Ashmore, The Battle and the Breeze, p.8; see also Schurman in discussion on p.106 of Goldrick and Hattendorf, eds., Mahan is Not Enough.

14 Interestingly, discussions had already taken place on arming these ships’ Harrier aircraft with tactical nuclear weapons – see AIR 2/18149, which is still classified but contains, according to the PRO class list, papers dating back to 1969.
assault ships and commando carriers. Escort vessels remained relatively ubiquitous, as did submarines; the anti-submarine capabilities of both improved markedly. The most notable change lay in the virtual dismantling of the reserve fleet, a result of economic decisions and the end of the broken-backed warfare role in the mid-1950s.

<table>
<thead>
<tr>
<th>Active and Reserve Strength of the Royal Navy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source: Wettem, The Decline of British Seapower, appendix (based in turn on annual Statements accompanying the Navy Estimates), with minor modifications</td>
</tr>
<tr>
<td>1950 Active</td>
</tr>
<tr>
<td>Battleships</td>
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<tr>
<td>Fleet carriers</td>
</tr>
<tr>
<td>Light fleet carriers</td>
</tr>
<tr>
<td>Commando carriers</td>
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<tr>
<td>Cruisers</td>
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<td>Fleet escorts</td>
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<td>A/S escorts</td>
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<td>Submarines</td>
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<tr>
<td>Missile submarines</td>
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<tr>
<td>Minesweepers</td>
</tr>
<tr>
<td>Total ships</td>
</tr>
<tr>
<td>Manpower</td>
</tr>
</tbody>
</table>

The importance of trade defence and extra-European roles to the Royal Navy waxed and waned in turn, but both subjects continued to attract more naval attention than nuclear strategy, which they pre-dated by several centuries. Academic theories of deterrence and political disputes over ‘independence,’ arms control, the MLF and its successors have been discussed infrequently in these pages. This is no accident. As Gretton put it in 1965:

I am anxious for many reasons not to get involved in a discussion of the British contribution to the deterrent and whether it is independent or not. This I believe is mainly a political question dependent on estimates of statesmen’s characters and reactions in crises . . . it does not affect . . . the main issues. 15

Such subjects began to impinge on the Navy to some extent in the 1950s and 1960s. From 1957, for example, the Senior Officers’ War Course at Greenwich incorporated lectures from civilian strategists, and the pages of the Journal of the RUSI – though interestingly not the Naval Review – began to carry numerous articles on nuclear subjects. 16 But the Navy’s dislike for cleverness diminished only slowly. An officer’s training, beginning at a later age after the war, continued to emphasise practical subjects, especially seamanship, and to foster consciously the common sense, initiative and esprit de corps of the traditional Navy over modern notions of strategy. A much greater and more varied element of technical training was incorporated as time went by, and the dominance of the traditional specialisms

16 PRO, Greenwich RNC Symposium on Strategy 1957, papers in ADM 203/79.
steadily diminished as the big ships and big guns themselves disappeared.17 Ambitious officers gained preferment through service in anti-submarine warfare, in NATO as well as Admiralty desk jobs, in escorts and even in minesweepers. This broadening of horizons should not however be exaggerated: command at sea remained the central element of any successful career, as the depth of feeling over the ‘wet’ and ‘dry’ officer lists of 1956 demonstrated.

The location of bureaucratic control over the Navy had changed by 1970, but its character, in practice, had not. The central Ministry of Defence had absorbed the Admiralty, but naval officers still disliked service in Whitehall; the reactivity, the paperchase, the ‘wait and see’ of policy-making remained. The Chiefs had lost some of their influence to the Permanent Secretary and other civilian advisers in matters of planning and procurement, but inter-service rivalry was no less pronounced. In particular, the Navy remained at almost permanent loggerheads with the RAF. The abolition of Bomber Command and the cancellation of the large aircraft carriers and TSR.2 prolonged the prewar and wartime legacy of bitterness. Air Marshal Menaul’s extraordinary tirades in his 1980 book against “sinister forces . . . at work in Westminster and Whitehall” and “the biggest act of government-sponsored vandalism ever witnessed in this country” (to wit, the scrapping of two prototype aircraft) indicate little room for compromise over the view that “Bomber Command [was] Britain’s greatest military achievement this century or, perhaps, of all time.”18 Henry Leach recalled that “when I left Whitehall in 1974 the relations between the RN and RAF within the Ministry of Defence were at an all-time low.”19

This is a particularly depressing example of continuity in British military thought, but the phenomenon as a whole is nevertheless interesting. Various potential drivers for change were certainly present in the twenty-five years after the war. Foreign navies, as noted above, were embracing change more or less wholeheartedly. Britain’s international position was vastly different in 1970; elections produced a variety of Conservative and Labour administrations; the defence machinery was repeatedly reorganised, expressly to increase central civilian control and to promote more logical decision-making; economy-led reviews repeatedly shook the armed forces. A new generation of officers came to occupy positions of power and influence. Their operational experience, although it had begun during the Second World War, was chiefly of the Cold War. New technological fancies were constantly being placed on the naval and military cakestand. Rear Admiral Hill has concluded however that the Royal Navy’s judgement throughout the postwar period remained “that the nation’s needs would best be served by a fleet of high quality and long reach, and that any justification should be employed to achieve that end so far as the Treasury would allow.”20 How did this belief in the flexible, balanced fleet remain through thick and thin unshaken?

Notes and references:

17 Note however that even Julian Oswald, First Sea Lord at the beginning of the 1990s, began his career as a midshipman in the battleship Vanguard.

18 Menaul, Countdown: Britain’s Strategic Nuclear Forces, pp.144, 151, 113.

19 Leach, Endure No Makeshifts, p.163.

Conclusions

‘British decline’ is a favourite theme of contemporary historians, but an inadequate framework for postwar naval history. There is almost no evidence that naval officers or Admiralty officials — as opposed to politicians — wished to cling to nuclear weapons as a substitute for real power in the modern world; I have argued that, on the contrary, they showed little inclination to favour nuclear weapons at all. The Royal Navy declined little in numbers of active fleet ships, and its overall shape remained similar. In some areas it introduced notable new capabilities. Its imperial policing role failed to die with the Empire, and appears in the 1990s to be re-emerging. Change in Britain’s international position can be dismissed as a key influence on naval thinking about nuclear weapons.

Although postwar British politicians generally had little understanding of nuclear weapons, and few regarded defence as important to their careers, the two leading exceptions to this rule, Sandys and Healey, wrought some changes. Sandys provoked a furious naval and military reaction to his 1957 White Paper, and although much ground was clawed back by Mountbatten the reserve fleet for global war — already driven onto the rocks by the reviews and economies of 1955-56 — could no longer be salvaged. Healey too provoked much dissatisfaction; naval officers found his cancellation of the large carrier programme hard to forgive. His devoted attention to defence over many years, coupled again with a critical need to economise, succeeded however in diverting naval thinking once again to European waters and trade defence, and specifically in stimulating interest at the very end of our period in limited nuclear war. With these exceptions, it is notable just how often politics, economics and successive efforts to reorganise the defence machinery failed to have any long-term impact on the size, shape and basic organisational essence of the Royal Navy. The Navy, victorious in the Second World War and successful in all of its operations thereafter, even at Suez — until the politicians caved in to superpower pressure — saw little need to exorcise any ghosts by reforming itself in the search for a radical new nuclear role. It also beat off most external drivers for change; instead, as Hill argues, it maintained its flexible, high-quality and globally deployable ‘balanced fleet.’ Duffield has recently argued, similarly, that NATO conventional forces on the European continent in practice changed very little during the fifties, sixties and seventies despite significant shifts in political circumstances and declaratory policy. In the face of such conclusions, we should perhaps begin to question the value of conventional historical and documentary accounts of ‘commanding heights’ defence decision-making. A more holistic view of working-level policy implementation, hardware, exercising and operations may be more useful in distinguishing fantasy from reality in postwar defence. Actions, after all, speak louder than words.

Military innovation and technological determinism

It would be nonsense however to argue that there was no change at all in the Royal Navy or in its attitudes to nuclear weapons during our period. The passage of time and generational change undoubtedly affected thinking to a greater or lesser extent. Perhaps, as experience of strategic bombing in the Second World War receded, so did opposition to nuclear deterrence, and as experience of the Battle of the Atlantic

receded, so did thoughts of broken-backed warfare. Given the lack, at any stage, of empirical evidence of nuclear warfare at sea, perhaps theorising took over in the late 1960s, especially with the arrival of the intellectual Healey as defence minister and with the NATO Nuclear Planning Group’s deliberations. Perhaps too, as time went by, the threat of nuclear warfare became more unreal and therefore more thinkable. Nuclear weapons provoked a great deal of apocalyptic fear at certain stages of the Cold War, but although, for example, ABCD training could be made as realistic as possible, it was difficult to conceive either another global war or the conditions experienced in a nuclear explosion, especially the intangible effects of radiation. The safety problems of Red Beard, the fact that even a ballistic test of a dummy weapon required Prime Ministerial approval by 1964, and the very few occasions on which nuclear weapons have ever been fired in live tests – never by the Royal Navy – served to reinforce the impression that these weapons were ‘other.’ Blackett got to the centre of the entire nuclear dilemma with his realisation that the weapons inspired fear among rational men and were most unlikely as a result to be used. Weart and Boyer, however, have recently traced ups and downs in this fear over time, noting that as the 1960s progressed fear receded and nuclear weapons became further out of sight and out of mind. Polaris, in Faslane or hiding in the North Atlantic, exemplified this trend. The contrast is striking between the unreality of nuclear weapons and the reality of conventional torpedoes, bombs, guns and missiles regularly fired in exercises, added to the day to day practical hazards of ship handling, navigation and weather. Perhaps, indeed, it is not too fanciful to suggest that the growth of a ‘peacetime’ navy, with similar preoccupations to that of the Victorians in the late nineteenth century, and a similarly poor understanding of ‘real’ warfare, can be discerned. The acceptance of responsibility for strategic nuclear weapons, after initial opposition, might be put down in part to unreality – the unreality of conceptions of their use, and the unreality of fading memories of real war at sea. I have argued, however, that a strong practical streak remained in the Royal Navy’s thinking throughout our period. This, together with realistic exercising and training and a concentration of minds induced by great international tension, stood the Navy in good stead for example in 1982. It also reveals an interesting attitude to technological innovation.

New technology certainly affected the Royal Navy’s thinking on nuclear weapons. Nuclear submarine propulsion made anti-submarine warfare more difficult and eventually forced the development of the nuclear depth bomb as a partial counter to the SSN. It also made possible the long and invulnerable patrol of the SSBN, and thus, at one level, the adoption of Polaris. Smaller, more efficient and also safer warhead designs made the second-generation tactical nuclear bomb potentially much more useful than Red Beard. The helicopter and the unmanned guided weapon made possible the use of nuclear anti-submarine weapons at a safe distance from the launching vessel. Technology permitted such innovations, but a large number of innovations was nevertheless rejected. Nuclear-tipped torpedoes and SAGW, nuclear-armed midget submarines and nuclear artillery shells made little sense, although some were studied for a time.

22 Weart, Nuclear Fear; Boyer, By the Bomb’s Early Light.

23 See Gordon, The Rules of the Game, for a trenchant view on this kind of trend.
There is a tendency in modern military history to write approvingly of technological innovation and disparagingly of conservatism. Detailed research has generally dismissed the wilder accusations of pig-headed reactionary thinking in the Royal Navy, and for every example of an admiral who thought submarines were "damned un-English" there is now published evidence of serious work in torpedoes, gunnery, anti-submarine warfare. Nevertheless the Royal Navy is generally bracketed with the conservatives, and its attitude to nuclear weapons bears this out to an extent. The Navy had emerged from the Second World War a flexible and, to a large extent, an improvised force, but it was not, in the sense of immediately espousing any programmatic or deterministic technological or strategic future, innovative. It is possible to argue further, however, that innovations such as carrier aviation, the UK's air defence system under Dowding, blitzkrieg or modern amphibious operations are as often false dawns or self-fulfilling prophecies as brilliant insights which save the innovator's day when it comes to the fight. How useful, for example, was blitzkrieg on land? It won the Battle of France in double-quick time in 1940, but it came rather unstuck when like met like at Kursk, and there is room for debate on how mobile or useful a tank campaign on the North German Plain would have been at any time between 1949 and 1989. And how brilliant was the insight that replaced the battleship with the carrier? Carriers were central to the battles of Midway and the Coral Sea, under precisely the conditions for which they had been built by the US and Japan, but would a fleet of carriers have benefitted the Royal Navy in 1939? Was the Navy wrong not to build such a fleet? Would it have saved Norway, Crete or Singapore? Possibly. Could it have decided the course of a war with Germany? No. Only the numerous piecemeal and flexible innovations of the Battle of the Atlantic achieved this. Modern military history is in fact littered with dead-end technological innovations like the balletic mid-Victorian Mediterranean Fleet and its signals book, the more warlike Grand Fleet at Scapa Flow, Bomber Command in 1940, and perhaps also the atomic bomb. Whilst technically impressive, such innovative forces did little to win wars. Conservatism appears to have its place alongside innovation. To regard the Japanese carrier fleet of the 1930s, for example, as a success, and the conventional global war Royal Navy of the 1950s as a failure, is inadequate. To understand the present, as naval and military historians forever seem determined to do, we should try to understand those in the past who have waited sensibly on developments, as well as those who have seized upon technological possibilities and pursued them, in some cases, to their reductio ad absurdum. The story of the Royal Navy's healthy scepticism towards nuclear weapons can perhaps help this understanding.


Appendix: RN Nuclear Stockpiles

Mrs Neves: Here, it's the Ark Royal, Doris. Have you got their rock buns ready?
Mrs Edwards: Hang on!
Doris: Here we are, five for them and five for HMS Eagle.

(Monty Python’s Flying Circus)

Published estimates of the Royal Navy’s nuclear stockpile over the period since about 1960, when the first Red Beard tactical nuclear bombs entered service, vary between about twenty-five and fifty. Simpson puts the number of naval Red Beards at around forty by 1962; Norris, Burrows and Fieldhouse estimate a total of thirty by 1964. Recent estimates suggest between twenty and fifty naval WE 177 by the early 1990s.\(^1\) The documentary evidence, such as it is, suggests that these estimates are correct, certainly to within an order of magnitude. The Royal Navy’s nuclear stockpile was never large compared to those of the atomically better-endowed US and Soviet navies.

During 1955, the Navy appears to have based its initial requirement for Red Beard on the “storage space available in the commissioned aircraft carriers” — a typically practical idea with little strategic foundation.\(^2\) Although the Navy’s share of Red Beard production had not yet been decided, the First Sea Lord was told that there would be space for forty-four Red Beards by 1961 on fleet and light fleet carriers, probably HMS Albion, Ark Royal, Centaur, Eagle, Hermes and Victorious. These figures suggest that each carrier would have been able to stow between six and ten weapons.\(^3\) The RAF was counting on receiving more of the weapons than the Navy; by 1959, when Red Beard was entering production, a ratio of 10:3 had apparently been agreed.\(^4\) Without an overall total, this ratio tells us little. It seems that RAF ‘kiloton’ bomb requirements varied between 110 and 250 over the years 1955-59, perhaps eventually standing at 224, but some at least of these totals included the first generation atomic bomb Blue Danube. It is possible that Red Beard totals may have been as low as fifty-two, of which perhaps twelve would


\(^{2}\) PRO, ACAS(OR) to DCAS of 9 Feb 1955 in AIR 2/13693.

\(^{3}\) PRO, DCNS to ISL of 28 Jul 1955 in ADM 205/106; HMS Albion was probably not, ultimately, equipped to carry nuclear weapons. Norris, Burrows and Fieldhouse suggest a similar figure of six to ten weapons per carrier for WE 177, made up of three to five bombs and three to five NDBs (*British, French and Chinese Nuclear Weapons*, pp.132-3).

\(^{4}\) PRO, ACAS(OR) to DCAS of 19 Mar 1959 in AIR 2/13678.
have been allocated to the Navy. In April 1959, eight Red Beards were certainly expected for the Navy from the first two years’ production. The following year, the Admiralty secretariat set aside £4 millions to complete Red Beard procurement in 1961/2, but this figure is of little use to the historian without a unit cost. One Air Ministry document of 1961 states a requirement for twenty “gauntlet safes” on land to store naval Red Beard weapons; unfortunately it is not clear that one safe equalled one weapon. Some Red Beards might always be held at sea; the same document, on the other hand, recommended procuring more safes than weapons for the RAF, to allow for weapon movements. At the risk of sounding extremely cautious, I would suggest on the basis of this discussion that the Royal Navy took delivery of between twelve and thirty Red Beards between 1960 and 1962. It is possible that the Navy eventually received rather more than its original small proportion of Red Beard production, since the RAF now had access to American weapons supplied under Project E.

The second generation WE177 was already under development, and the Navy’s stockpile requirements seem initially to have been greater than they had been for Red Beard. In 1962, it was suggested – but not decided finally – to reduce the requirement from sixty-three to twenty-four. One possibility is that the Admiralty was now proposing to base its requirement on one-for-one replacement of Red Beard, rather than some other, earlier criterion, but this is pure speculation. The following year, plans for the new carrier CVA-01 were far enough advanced to include storage space for nuclear weapons; twenty was the figure mentioned. Storage for sixteen nuclear weapons was also to be available in a new replenishment ship planned for the Royal Fleet Auxiliary. Although in service WE177a could be used by a greater variety of fixed wing aircraft and helicopters than Red Beard, it seems that its storage, at least in peacetime, remained limited initially to carriers and

5 PRO, DCAS to Brundrett of 8 Mar 1955 in AIR 2/13693 (250 Red Beard); Air Ministry mtg of 29 Nov 1957 in AIR 2/13678 (110 Red Beard); A/ACAS(Ops) brief of 4 Mar 1959 in AIR 2/13678 (224 ‘kiloton’ bombs); R J Penney to Treasury of 10 Feb 1960 in AIR 2/13774 (110 ‘kiloton’ bombs including 58 Blue Danube).

6 PRO, D of Ops(B&R) to DCAS of 6 Apr 1959 in AIR 2/13678.

7 PRO, Board memorandum B.1336 of 27 May 1960 ‘Long Term Costing Exercise 1960 Phase I’ in ADM 167/157. In 1958, a nuclear warhead for an SAGW would have cost £500k (note of 7 Mar 1958 in AVIA 65/2086); by 1962, an NDB was costed at perhaps £200k (Board memorandum B.1417 of 7 May 1962 in ADM 167/154), suggesting that £4M would have bought the Admiralty a further eight to twenty Red Beards; it is impossible to be certain, however, that the unit cost of the first generation weapon with its small production run would not have been substantially greater.

8 PRO, loose minute of 8 Mar 1961 in AIR 2/13775.


10 PRO, Board memorandum B.1456 of 8 Jul 1963 in ADM 167/161 (it is not clear whether Red Beard was intended here, in which case twenty or more must therefore by now have been produced, or whether WE177 was now being discussed).

RFAs. This will have set a practical limit on its numbers similar to that for Red Beard. In 1967, following the decision to axe the Navy's large carriers, it was suggested that some naval nuclear weapons should be transferred to the RAF for the new HS801 maritime patrol aircraft, later the Nimrod. One document suggests that twenty-six weapons, presumably WE177a, were involved, although it is not clear whether this represents the entire stockpile or whether the Navy intended to retain additional weapons over and above this number, for example for use by anti-submarine helicopters based on HMS Hermes, Blake and Tiger. On balance, it seems more likely that the former conclusion is correct, and that a decision to retain at least some weapons for naval use was taken only later. I would suggest that around twenty-five naval WE177a were procured initially. This tallies with Norris, Burrows and Fieldhouse's estimate. It is possible however that the total increased somewhat in the 1980s as the Cold War increased in intensity and plans were developed to fight the Soviet Navy in northern waters.

12 PRO, COS.14/66 of 28 Jan 1966 in DEFE 5/165; note however that Norris, Burrows and Fieldhouse suggest wider dispersal of WE177 weapons at sea in destroyers and frigates by the 1980s (British, French and Chinese Nuclear Weapons, pp.132-3).

13 PRO, manuscript addition to ACAS(Pol) note of 19 May 1967 in DEFE 24/293.
Appendix

"Here comes another one—'My boy says Skybolts are out of date—can he change it for a Polaris?'"

Fig. 26: Skybolts are out of date
This was Carl Giles’s view of the Skybolt crisis in the Daily Express.
Skybolt was cancelled, and agreement secured for a UK Polaris programme, during the Christmas shopping period in 1962.
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