In early 1957, Harold Macmillan inherited a government in crisis. British, French and Israeli forces had invaded Egypt in October 1956, but were forced into an ignominious withdrawal by December—under American pressure—ending their unsuccessful military adventure.

The Suez crisis divided the Conservative government and, suffering from chronic depression, British Prime Minister Sir Anthony Eden fled to Jamaica in November. He spent weeks relaxing with his wife Clarissa at Goldeneye, the tropical retreat of novelist Ian Fleming, creator of the James Bond thrillers.¹ Eden’s Personal Private Secretary Evelyn Shuckburgh noted his fragile mental state:

A.E. has broken down and gone to Jamaica. This is the most extraordinary feature of the whole thing. Is he on his way out, has he had a nervous breakdown, is he mad? The captain leaves the sinking ship which he had steered personally onto the rocks.²

Eden was certainly ‘on his way out’. Former Foreign Secretary and Chancellor of the Exchequer Harold Macmillan moved to replace the ailing leader and succeeded Eden as prime minister on 10 January 1957.

The new prime minister quickly moved to revitalise the crumbling British Empire. One of Macmillan’s most significant decisions was to accept that Britain could no longer afford to garrison its vast network of colonies. His government initiated an ‘audit of Empire’ to look at the status of Britain’s overseas dependencies. He also launched initiatives that led to the UK application to join the European Economic Community.
Working with Minister for Defence Duncan Sandys, Macmillan began a defence review that ultimately transformed Britain’s nuclear program and brought closer integration with US first strike nuclear war fighting strategies. The recognition that Britain’s small atomic arsenal could do limited damage to the Soviet Union, while making the United Kingdom a key target for Russian nuclear counter-attack, only accelerated the push to develop a British thermonuclear weapon.

With the Conservative government buffeted by domestic and international criticism, its nuclear weapons program became an important symbol of British power and status. For this reason, there was a need to bury news of scientific difficulties and present the Grapple tests as a shining example of British technological prowess.

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Later in life, Harold Macmillan’s memoirs pointed to the importance of the first Grapple test:

On 15 May came the successful explosion of the first British H-bomb.3

Following the first Grapple test on 15 May 1957, the newsletter released to British troops on Christmas Island proclaimed:

Bomb gone! H-Bomb puts Britain on level terms … A flash, stark and blinding, high in the Pacific sky, signalled to the world today Britain’s emergence as a top-ranking power in this nuclear age.4

The third Grapple test on 19 June, codenamed ‘Purple Granite’, was also hailed as a huge success. With a cricketing metaphor, the Mid-Pacific News reported: ‘Hat trick—third drop successful’.5

From London, the UK Ministry of Supply issued an official statement noting: ‘the tests have been so successful that nothing could be gained from continuing them’.6

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Privately, however, scientists calculated that the objective of achieving a 1-megaton thermonuclear weapon had not been achieved, with yields between 0.2 to 0.7 megatons for the three blasts. William Cook, the deputy chief scientist of the H-bomb development program, told Grapple Task Force Commander Wilfred Oulton:

We haven’t got it quite right. We shall have to do it all again, providing we can do so before the ban comes into force; so that means as soon as possible.  

In later years, some historians have argued that the public proclamation of success in May 1957 was a massive political bluff. They argue that London hoped to persuade the United States to review the 1946 McMahon Act and renew contact between scientists from the two countries, which had been broken by a series of British spy scandals. Others have countered that the United States already knew about the limited yield from the tests, because US observers were present at the second UK test. They also note that Sir William Penney and other scientists were in regular contact with their US counterparts.

Even today, British authorities are embarrassed that the first three tests did not reach megaton range. With extensive input from the Atomic Weapons Establishment, BBC TV broadcast a documentary in May 2017 that lauds the pluck and ingenuity of the British scientists that developed the hydrogen bomb. The documentary culminates triumphantly with the Grapple X test of November 1957, with the narrator proclaiming:

The H-bomb had a yield of 1.8 megatons. For the scientists, it was a triumph … the scientists had defied the odds and realised the politicians’ dreams.

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7 Secrecy about the explosive power of the Malden Island tests was maintained for decades. The postscript to Wilfred Oulton’s 1987 book about Operation Grapple incorrectly reports that seven of the nine tests reached megaton yield (Christmas Island Cracker—an account of the planning and execution of the British thermonuclear bomb tests 1957 (Thomas Harmsworth, London, 1987), p. 403). In fact, only three of the nine Grapple tests, and none of the tests on Malden Island, were measured at megaton yield, as confirmed in the official history of the tests published by the Ministry of Defence (MoD) in 2001 (Lorna Arnold: Britain and the H-bomb (Palgrave Macmillan, London, 2001), Appendix 2, p. 236).

8 Wilfred Oulton: Christmas Island Cracker, op. cit., p. 356. Cook had served as chief of the Royal Navy’s scientific service, but was appointed as William Penney’s deputy in 1954.


11 Britain’s Nuclear Bomb: The inside story, BBC TV documentary, broadcast 3 May 2017 (spoken by narrator at 56 minutes).
The film, however, never mentions that there were three previous tests at Malden Island in May and June 1957, all of which failed to reach the expected yield. With careful wording, the film even implies that Grapple X was conducted at Malden Island, rather than Christmas Island where thousands of troops were based! Shamefully, in an hour-long documentary, the BBC includes just one sentence to mention the decades-long controversy over nuclear safety for the troops during the tests.12

The official historian of Operation Grapple argues that, like the atomic tests in Australia, the three Malden Island tests were still a significant step in developing the hydrogen bomb:

*Purple Granite* was fired on 19 June and operationally was a complete success, but the scientists at Christmas Island made a preliminary estimate of the yield at only 200 kilotons—even less than *Short Granite*. Grapple had been valuable; but undeniably disappointing as the American observers too were well aware … Present policy was to move everything worth removing from Christmas Island after Operation Grapple. However, if facilities had to be rebuilt, a megaton trial could not be planned in less than about 18 months and if there was to be yet another trial at Christmas Island in 1959, a decision must be taken in 1957.13

At the time, the disappointing results meant there would need to be a quick decision by the British Government. As one Foreign Office historian has noted:

The hallmark of British policy in 1957 was its great sense of urgency, designed to achieve as much as possible before any constraints on atmospheric nuclear tests could be agreed or were imposed. In fact, the thermonuclear program was conducted against the clock: the dates for the Christmas Island tests were set for political rather than technical reasons.14

Should they conduct another series of tests? While the government privately debated the options, Air Vice Marshall Oulton needed to know whether to maintain the large—and expensive—naval and military force in the Pacific.

12 ‘Since this [Hurricane] test and the others that followed, thousands of veterans have claimed they’ve suffered health problems as a result—claims which have not been accepted by successive governments.’ BBC TV, op. cit., spoken by narrator at 42 minutes.
Rather than send a naval task force and thousands of men back to Malden Island—more than 600 kilometres from the base of operations—a cheaper option would be to test at Christmas Island. The decision to move from Malden to Christmas Island reduced the enormous logistic problems. But it brought the tests much closer to the military camp where thousands of British, New Zealand and Fijian personnel were stationed and to the village where the Gilbertese plantation workers were housed.

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Even before the final test in the original Grapple series, the Ministry of Defence (MoD) was lobbying Minister of Supply Aubrey Jones to ensure that the Grapple Task Force would halt the planned decommissioning of the Christmas Island base. In an 11 June 1957 memo, eight days before the Purple Granite test, Minister for Defence Duncan Sandys wrote:

I understand that instructions are being given to dismantle the test facilities on Christmas Island at the conclusion of the Grapple series. The new American disarmament proposals, which have been put by them to the Russians, might conceivably lead to a moratorium on nuclear tests as early as 1 July 1958. In these circumstances, we ought, if possible, to keep in being facilities for carrying out further tests at Christmas Island in the first half of next year. Please let me know whether this is practicable and what the financial and other implications would be. Meanwhile all action to dismantle these facilities should be suspended.15

Another letter from Jones to Prime Minister Harold Macmillan highlighted the cost of operations so far from England, as well as the uncertainty as to whether tests of this nature would continue, because of the difficulty of maintaining a care and maintenance force on an isolated island and because rough financial calculations showed that, unless tests were remounted at Christmas Island at intervals of less than three years, it would be as economical to evacuate the equipment, as to maintain it’.16

15 Memo from Minister for Defence Duncan Sandys to Minister of Supply Aubrey Jones, 11 June 1957. CO1036/282.
Jones added that ‘the Task Force Commander ought to have firm instructions. Without them, some 4,000 men will be idle in the area with a disastrous effect on morale, while great confusion will result from the disruption of transport arrangements’.17

Macmillan agreed that the military should halt the closure of the base, telling his ministers:

The Task Force Commander should be asked to reverse his plans for withdrawing equipment and to arrange for a service of 200 to 250 to be kept on Christmas Island until replacements of a similar number arrive. No decision needs to be taken yet about the future program of tests, we will try to take this decision of our future program as soon as possible.18

The British Cabinet was panicked by the proposal for a moratorium on atmospheric nuclear testing by the two superpowers, the United States and Soviet Union. Despite (false) public claims that the three Malden tests had reached megaton range, ministers soon realised they would have to continue testing to develop an effective thermonuclear device.

On 22 June, just three days after the Purple Granite test, Cabinet ministers privately debated whether to announce a further series of tests. Some argued for a parliamentary statement to clarify the situation. But Prime Minister Macmillan privately expressed disdain for the need to make a formal statement to parliament about the future of the testing program. In a letter to Aubrey Jones, Macmillan noted:

I have thought carefully over your suggestion for a statement, but I shall do my best to avoid it at present. Of all the Parliamentary techniques, I have always thought the ministerial statement the worst. A debate is one thing: you can put forward your own arguments and answer those of your opponents.

The P. Q. [Parliamentary question] is another: you can always call it off after two or three supplementaries. But in a statement, you have all the disadvantages of exposing every flank at the same time, without the power to cover any of them effectively. Supplementary questions go on indefinitely and not stopped by the Speaker and yet you have no right to wind up the debate. I believe that ministers would do well to avoid statements wherever possible or to confine them to formal matters.19

17 Ibid.
18 Prime Minister’s personal minute, serial no. M277/57, 15 June 1957. CO1036/282.
19 Prime Minister’s personal minute, serial no. M291/57, 22 June 1957. CO1036/282.
Even though the naval task force had disbanded, the decision was made to continue with a ‘maintenance party’ on the island. Ministers were reluctant, however, to issue a public announcement of their decision, fearful that the opposition Labour Party would quickly argue this meant there would be a further series of nuclear tests. In response to his ministers’ concerns, Macmillan wryly noted:

To keep a fire engine is not a proof that you propose to commit the act of arson.20

British officials realised that the secret of further tests would not last long, given the number of British troops involved:

This information is secret at the moment but some announcement will have to be made in the near future as will not be possible to conceal the change of plan after some of the service personnel on the island have been informed that they will be required to remain on the island to hand over to maintenance party which will be sent out from the UK later in the year.21

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As well as deciding how much to tell the British public, the Macmillan Government was also torn between the need for secrecy and the need to consult with Commonwealth nations in the Pacific.

Macmillan’s Secretary of State for Commonwealth Affairs Alec Douglas-Home (the Earl of Home) argued it was vital to keep Australia and New Zealand informed, especially if there was to be any parliamentary statement about the future of Christmas Island testing. In a letter to Minister of Supply Aubrey Jones, Lord Home stressed:

Should there be any question of our making any statement which might reveal or even imply our future intentions as regard tests, we must consult them fully about it beforehand. Indeed I think that the sooner we are able to tell them fully and frankly our problem about future testing in the light of disarmament, the better it will be.22

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20 Ibid., p. 2.
21 Memo from Mr Moreton to Prime Minister’s Office, 19 June 1957. CO1036/282.
Queen Elizabeth meets Commonwealth prime ministers, including Harold Macmillan of the United Kingdom (back row, to left of Queen), Jawahararl Nehru of India (front, third from left) John Diefenbaker of Canada (fourth from right) and Robert Menzies of Australia (second from right)
Source: UK Government.

On 24 July, the decision to wind down operations after three tests was reversed. Macmillan told the Ministerial Committee on Atomic Energy that further tests would be required to allow the Atomic Weapons Research Establishment (AWRE) scientists to develop fusion, rather than fission, weapons.23

HMS Warrior and HMS Salvctor had already set sail for England, but other ships, including HMS Narvik, HMS Messina and RFA Fort Rosalie, were turned around and returned to Christmas Island. In early August, 400 troops of the 25th Field Engineer Regiment were flown via Honolulu to the Line Islands to replace the personnel of the 28th Field Engineers who had been working on Christmas Island since June 1956. By the end of August, the majority of personnel had been replaced with new troops.

23 Confidential annex, Minute 1, Ministerial Committee on Atomic Energy, Meeting 1, papers 1–2, 24 July 1957. UK National Archives Cabinet papers CAB 134/1328.
In preparation for the next test in November, Valiant aircraft began returning to the island on 11 October, with the Canberra ‘sniffer’ planes of 76 Squadron returning from Australia after participating in Operation Antler at Maralinga. The three atomic tests in South Australia (Tadje, Biak and Taranaki), held between 14 September and 9 October 1957, tested atomic triggers that could be used in a two-stage thermonuclear weapon, which was subsequently tested in Grapple X, Y and Z.

Even as the Grapple Task Force redeployed military and scientific personnel to Christmas Island, the UK Cabinet sought political and logistic support from the Australian, New Zealand and Canadian governments. Commonwealth Relations Office archives reveal personal correspondence between the prime ministers in London, Canberra, Wellington and Ottawa, showing that all three Commonwealth governments backed the UK plans and offered support from their armed forces. They all, however, pressed for secrecy to avoid adverse public reaction that could damage them politically.

In late July 1957, Macmillan met with Robert Menzies in London, who had been re-elected as Australian Prime Minister in January 1956. Macmillan briefed his Australian counterpart about the planned expansion of H-bomb testing, anxious to bolster Menzies’ support for further operations in the desert of South Australia (previous British A-bomb testing at Maralinga had ended in October 1956, but the British were eager to use the desert test range again to develop atomic triggers for the thermonuclear weapons).

Australia was already well integrated into the weapons program. In 1956, the Menzies Government had signed a contract with the UK Atomic Energy Authority (UKAEA) to supply uranium for UK nuclear weapons development, using ore mined at Mary Kathleen in Queensland.

On 26 July 1957, Macmillan sent a personal message to New Zealand’s Prime Minister Sidney Holland, seeking his support:

I have spoken to Menzies, who is here, and he is very anxious that we should proceed and will give us all the help that we require from him. I may be questioned in Parliament before we rise, in which case I shall merely try to keep my hands free and say that until such time as there is an international agreement on tests we must be free to proceed, but I shall of course give no indication of our decision. No doubt in the course
of the next period there will be a certain leaking because of personnel involved, but I think we can ride this as long as none of us makes any definitive statement.24

In a detailed message the following day, Macmillan sought Holland’s assistance for another series of tests later that year. He expressed concern that growing pressure for a Partial Test Ban Treaty in the United Nations might force a halt to the British testing program before the UK could finalise development of its megaton weapons:

Even if a partial disarmament plan were to be agreed, there would certainly be a period before it could take effect, either as regards the suspension of tests or the cut-off of production of fissile material. Pressure may, however, grow for the suspension of tests as a measure isolated from a partial disarmament agreement and a resolution proposing this may well be introduced in the General Assembly of the United Nations during the forthcoming session.

In that event, we should be in great difficulty with our public opinion and might be obliged to acquiesce. In order to forestall this risk therefore, we have decided to hold further megaton tests in the late autumn of this year. These tests would be in addition to the kiloton weapons trials we have already planned with the cooperation of the Australian government at Maralinga in September.

We have a ready-made base for the megaton weapons trials at Christmas Island where the facilities established for Grapple are being maintained. It would obviously be out of the question for us to find another site and establish a new base in the time and therefore we propose to carry out the tests close to Christmas Island (instead of Malden Island as on the previous occasion).

I hope therefore that you will feel able to agree that we might have reporting and measuring stations on your islands again. We should also be very grateful to have again the service of the Royal New Zealand Air Force (RNZAF) in collecting samples from outlying stations and of the Royal New Zealand Navy (RNZN) frigates as weather ships … I should therefore be very grateful if you could let me know quickly whether—as I much hope—you agree in principle to give us logistic support on the lines I have mentioned.25

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24 Telegram no. 492 from Commonwealth Relations Office to UK High Commissioner in New Zealand, 10:45 PM, 26 July 1957. CO1036/282.
Macmillan also acknowledged the growing concern in New Zealand about nuclear testing, and disquiet in NZ Pacific territories like Western Samoa (highlighted by the 1956 Samoan petition to the UN Trusteeship Council, calling for a halt to the British tests):

I realise that the holding of a further series of nuclear tests in the Pacific may expose you to renewed pressure against the tests from a section of your public opinion. My colleagues and I greatly appreciate all the help you gave us in this respect over Operation Grapple and much hope that in the circumstances I have set out, we may count on your help once again.26

Holland’s reply pledged that New Zealand would support further tests on Christmas Island with a naval deployment, as they had done at Malden Island. His reply also highlighted the concern of both UK and Commonwealth governments that there was growing international pressure for a nuclear test ban treaty:

I fully understand reasons for United Kingdom’s wishing to continue and complete Grapple in face of possible United Nations and popular pressure. I note also that Mr. Menzies, whom you were able to consult in London, is anxious that you should proceed and that he will give all possible help.

For my own part I am quite willing to agree that New Zealand should give whatever assistance as possible on lines similar to that accorded for the tests. You may be assured that Air Vice Marshall Oulton will be given every facility to discuss his needs with service people here.

I can appreciate that your present planning does not permit you to give me any precise idea of date of any tests, but I do hope that it would be possible on this occasion to keep me fully informed as to your intentions, especially in view of fact that they may very well coincide with date of the New Zealand general elections.27

Macmillan replied:

I am very grateful for your most helpful personal message and for your willingness to assist us. You may rest assured that I shall keep you fully informed as to our intentions on dates as soon as possible to be precise.28

26 Ibid., p. 2.
27 Telegram no. 312, marked ‘Top secret and personal’, from UK High Commissioner in New Zealand to Commonwealth Relations Office, 2 August 1957. CO1036/282.
Macmillan advised Lord Carrington, the UK High Commissioner in Australia, that Menzies had indicated support for the expansion of the H-bomb program. A message from officials in London to Carrington in Canberra noted:

You should know for your strictly personal and secret information that Prime Minister spoke and has subsequently written to Mr. Menzies on similar lines and requested same facilities in Australia as we had for Grapple. Mr. Menzies indicated that he would give all the help we require.29

Menzies had long been a supporter of the British nuclear program, personally approving atmospheric tests in Australia without seeking Cabinet or parliamentary approval. The telegram to the High Commissioner in Australia noted, possibly ironically: ‘Presumably he will be informing Australian government.”30

Like Australia and New Zealand, Canada had joined the United Kingdom and United States in the 1947 UKUSA agreement, which opened the way for joint intelligence and surveillance operations between the five Anglophone nations.31 Macmillan now turned to Canadian Prime Minister John Diefenbaker seeking support for the H-bomb program.

Less than two months after he was elected to office, Diefenbaker was personally approached by the British prime minister with a request to support the testing program. Macmillan asked his Canadian counterpart to allow overflights of Canada by RAF aircraft carrying the nuclear weapons from England to the Pacific. On 2 August, Diefenbaker wrote to Macmillan approving the flights:

I appreciated receiving the personal message … concerning your desire to have certain of your service aircraft overfly Canada and land at Goose Bay and Namao en route to and from nuclear tests to be held at Christmas Island in the late autumn. We would be glad to cooperate in the manner

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30 Ibid.
31 Jeffrey T. Richelson and Desmond Ball: The Ties That Bind—Intelligence Cooperation Between the UKUSA Countries—the United Kingdom, the United States of America, Canada, Australia and New Zealand (George Allen and Unwin, Sydney, London and Boston, 1985); Nicky Hager: Secret Power—New Zealand’s Role in the International Spy Network (Craig Potton Publishing, Nelson, 1996).
you suggest … I assume that the same precautions in regard to safety will be followed as were followed in the earlier operations of the same nature, and it will not be necessary to give publicity to these flights over Canada.  

Uncertainty over the number of further tests on Christmas Island was causing problems for the Grapple Task Force, given they might have to return unused weapons to the United Kingdom if they were not fired. This was especially a diplomatic problem with Washington, as the warhead would have to transit through US air bases on the way home. The Atomic Weapons Trials Executive noted:

There were indications that return by air might be unwelcome to the US government.  

Starting from August, there was massive investment in new infrastructure on Christmas Island. The wharves at Port London were rebuilt, while the main runway of Casady Field was resurfaced. New hangers and a control tower were built. The road from Port London village to the airfield was covered in asphalt. New huts with water and sanitation were built at Main Camp and Port Camp to replace some of the tents that housed the troops in 1956–57.

Despite the thousands of personnel involved, the fear that the next test would be another dud meant that the cult of secrecy was to be maintained:

The Prime Minister has approved that there will be no observers at Grapple X and so informed the prime ministers of Canada, Australia and New Zealand.  

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With preparations underway, the British Government could now decide on the timing of future tests. Throughout this period, as the Macmillan Government prevaricated over the public announcement of Grapple X, officials were pressing for a quick decision from government ministers:

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33 Atomic Weapons Trials Executive: Operation Grapple X, minutes of meeting held at St Giles Court, 11 September 1957, p. 3. CO1036/283.
34 Ibid.
It was agreed that this conflict between the desire for secrecy and the need to push the operation through should be put to the Prime Minister, together with some similar critical decisions. If he agreed to go ahead, delivery of the equipment and briefing of the people to operate it would be delayed till about 7 October.\textsuperscript{35}

Ultimately, the next series of tests (Grapple X, Y and Z) were conducted with great urgency, driven by Cold War anxieties. Although the Pacific islands were marginal to the main Cold War fronts such as Germany or Korea, Soviet propagandists were ramping up criticism of British colonialism and the UK nuclear testing program:

Carrying out of tests of nuclear weapons is contrary to the principles and objects of international trusteeship. Britain has spent millions of pounds on establishing her own proving ground for nuclear weapons on Christmas Island. The first British hydrogen bomb was exploded on this island in 1957. The British imperialists have established big airbases in Fiji. The British military command regards these islands as the strategic centre of the south-western part of the Pacific.\textsuperscript{36}

The US and UK governments were panicked by the Soviet Union’s launch of its first intercontinental ballistic missile in August 1957. This was followed by the successful launch of the Sputnik satellite on 4 October 1957—the first satellite capable of orbiting the earth. A preliminary assessment by the Eisenhower White House of this Soviet space triumph reported that:

Soviet claims of scientific and technological superiority over the West and especially the United States have won greatly widened acceptance. Public opinion in friendly countries shows decided concern over the possibility that the balance of military power has shifted or may shift soon in favour of the USSR. The general credibility of Soviet propaganda has been greatly enhanced and American prestige and the American reaction, so sharply marked by concern, discomfiture and intense interest, has itself increased the disquiet of friendly countries and increase the impact of the satellite.\textsuperscript{37}

\textsuperscript{35} File note, D.J. Derx, Colonial Office, 18 September 1957. CO1036/283.


Fears of Soviet technological advances were compounded by a major fire in October at the Windscale nuclear plant—the British reactor responsible for producing the super-heavy isotope tritium used in the thermonuclear weapons.38

Under pressure to act, the Grapple Task Force rushed to conduct the next nuclear test by November 1957—but relocated from Malden to Christmas Island, home to thousands of military personnel and Gilbertese islanders.

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