

THE NUCLEAR TEST VETERAN RECORD DISCOVERY EXERCISE

Report by the Air Historical Branch (RAF) on work undertaken in 2025

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1. Historical background

1.1. Between 1952 and 1958, the UK conducted so-called atmospheric nuclear weapons trials in the Pacific and Australia under the operation names HURRICANE, TOTEM, MOSAIC, BUFFALO, ANTLER and GRAPPLE. Atmospheric trials then ceased under the terms of a moratorium dated 31 October 1958. Thereafter, UK nuclear weapons trials were conducted underground at the US National Test Site in Nevada, although non-explosive trials continued at Maralinga, Australia, until 1963.

1.2. RAF participation in nuclear weapons trials after 1958 largely took the form of cloud-sampling missions following atmospheric tests by other nations. These cloud-sampling operations were mounted on a small scale, relative to the UK atmospheric trials of the 1950s. It has been estimated that around 10,000 RAF personnel were involved in nuclear weapons trials between 1952 and 1967; 8,443 named individuals have been identified. It is likely that up to 90 per cent of all RAF personnel who participated in nuclear weapons trials and monitoring between 1952 and 1967 deployed during the UK atmospheric trials in the first six years of this period.¹

2. Task

2.1. The nuclear test veteran (NTV) record discovery exercise was undertaken by the three Service historical branches and the Atomic Weapons Establishment (AWE) under the central direction of the Minister for Veterans and People (MinVP) and the coordination of the Office for Veterans' Affairs (OVA). At the beginning of the NTV record discovery exercise, the Air Historical Branch (AHB) was tasked to investigate the surviving records on blood and urine tests reportedly conducted on RAF personnel deployed during nuclear weapons trials between 1952 and 1967.² The task sought to address concerns raised by the NTV community about their medical records.³

2.2. AHB was directed to clarify the RAF's policy on blood and urine tests and to research the extent to which policy was implemented. AHB was also tasked to locate the policy or instructions for the retention of this medical information and establish

the extent to which the information was transferred to individual service or medical files and/or retained elsewhere. If blood and urine sample data was not recorded in these files, AHB was asked to suggest possible reasons for its absence. The task involved researching a limited sample of the surviving records – not all the records. AHB was not tasked to provide a medical interpretation of blood count or urine test records.

3. Constraints

3.1. The NTV record discovery exercise was the largest single research task assigned to AHB since the end of the Cold War, and one of the largest ever assigned to the branch. It was also the only research task ever undertaken by AHB involving the extensive use of medical records and the RSWeb database⁴ to identify and request medical records. Two AHB staff were required to undertake Caldicott training specifically for the discovery exercise.⁵ The task involved many thousands of policy documents and hundreds of personal and medical files.

3.2. The exercise was conducted by three AHB staff – Head, one historian and the branch's senior researcher, all PhD-qualified. During the period of the exercise, they had also to undertake many other official enquiries and tasks, produce Freedom of Information Act responses, which are subject to statutory turn-around times, provide support to commemorative activity, and fulfil archiving, engagement, line management and administrative duties.⁶ One post out of AHB's team of five historians and researchers was gapped throughout 2025, and the branch as a whole was 21 per cent below its established headcount by October due to retirements. Return to establishment was subsequently prevented by the MoD civilian recruitment freeze.

3.3. The overwhelming majority of records were paper files and documents; only RAF Records of Service, the AWE files on the gov.uk website, and one AIR file from the National Archives (TNA, Kew) had been digitised. Of the policy records, the Air Ministry Orders (AMOs), Defence Council Instructions (DCIs) and one relevant Air Publication (AP) were held at AHB, but all remaining records (except the few online

records) had to be ordered back to AHB from the central MoD archive (Restore PLC), RAF Disclosures (at RAF Cranwell) or TNA, or viewed in the government reading room at TNA. TNA files have broad subject titles that provide little information about their contents. Files had to be individually checked page by page for relevant information.

3.4. The record discovery exercise began in January 2025. At an early stage, the RAF officer responsible for ethical research standards advised that the research methodology for the exercise should be approved by the MoD Research and Ethics Committee (MODREC) in accordance with Joint Service Publication 536, *Governance of Research Involving Human Participants*. Similar advice had already been received by the Naval Historical Branch (NHB).

3.5. These instructions, applicable chiefly to NTV medical records, were conveyed to the OVA, as it was clear that the MODREC submission process could complicate and extend the discovery exercise. Ministerial direction to view the NTV medical records without a submission to MODREC was received on 1 September 2025. This left a period of two months to retrieve the records from Restore and research their contents before AHB's final report was prepared and submitted to the OVA in November (the agreed timescale.)

3.6. To construct the dip sample, AHB sought to recall files shown on the RSWeb database held by Restore and the National Archives. After an initial investigation identified very few medical records, the search criteria were refined to focus on particular record categories that appeared most likely to produce results.⁷ More medical records were then found, but the location of many RAF medical records was nevertheless impossible to verify during the period of the exercise.

4. Methodology

4.1. The task was to investigate policy and the implementation of policy. The following sources were used to research policy:

- RAF (AIR) and Ministry of Aviation (AVIA) class files at TNA (250 files searched).
- A smaller number of Ministry of Defence (DEFCE) and AWE (ES) files of potential relevance to RAF NTVs (20 files searched).
- AMOs, DCIs and APs held at AHB (approximately 10,000 records searched).
- Extracts from the AWE Merlin database published on the gov.uk website (151 PDFs searched).

4.2. These records were also used to research the implementation of policy, along with the following:

- Records of Service held by RAF Disclosures (200 PDFs searched).
- Personal and medical files held at Restore (sample of 316 personnel)
- Personal files held at TNA (as above).

4.3. The standard British service medical record, F. Med 4, was introduced in 1950 and was in use throughout the 1952 to 1967 period.⁸ AHB research on the medical records was chiefly focused on 1957-1958 for two reasons:

- Although AHB conducted an extensive search of the AIR and AVIA class files at TNA across the entire 1952-1967 period, the surviving policy documents produced considerably more information about operations at Maralinga and Christmas Island in 1957 and 1958 than about earlier or later operations.
- Between 1952 and 1957, the RAF policy documents concerning personnel working with radioactive sources did not contain instructions to record blood count data in F. Med 4. The key RAF policy document that applied between 1963 and 1967 likewise failed to stipulate that blood count information should

be recorded in F. Med 4; this direction was only contained in a separate policy document.⁹

4.4. Research on policy revealed that its implementation was substantially delegated to unit medical officers, and hardly any records could be found of how they chose to implement this delegation. Consequently, AHB's research on the medical records initially focused on specific units for which blood count policy was more clearly defined at higher command levels due to the anticipated exposure of deployed personnel to radiation. These units were (1) 76 Squadron, which flew cloud-sampling missions during the nuclear weapons trials, and (2) an RAF balloon unit deployed into the forward ('controlled') area of Christmas Island during Operation GRAPPLE Z.¹⁰

4.5. After receiving authority to research the RAF medical records on 1 September 2025, AHB sought to recall the files shown on the RSWeb database. While most of these were held by Restore, some had been transferred to TNA pending release. Many RSWeb entries do not distinguish between files that contain medical information and those that contain only personal and service information. This explains why the majority of files initially examined were found not to contain medical documents, and why it was necessary to refine the search criteria (see 3.6 above). This approach allowed more medical records to be located, but the total fell significantly short of the dip sample figure.

4.6. The surviving files contain only the most limited and fragmentary references to urine samples, and AHB's work therefore came to focus overwhelmingly on blood counts. Blood counts were taken for two reasons, recorded in the documents as follows:

- 'To provide a base line against which to assess the results of possible future blood examinations in the event of accidental exposure of personnel to radiation levels in excess of the maximal permissible dosages.'¹¹

- ‘To exclude people with existing pathological conditions from the range [and] ... to be able to demonstrate that this has been done in any case in which a claim for damage is made.’¹²

5. Policy findings

5.1. While AHB conducted a substantial search of files at TNA for policy records, chiefly in the AIR and AVIA classes, they yielded very little useful information. These records are mainly concerned with operational matters and provided little insight into the key issues central to the discovery exercise, such as health physics. However, a sample of DEFE and ES files with titles that appeared directly relevant to the exercise did not produce useful results either.

5.2. RAF policy was mainly recorded in AMOs and similar documents held at AHB. These records show that the RAF did not develop a standardised policy on blood counts for many personnel who attended the nuclear weapons trials of the 1950s and 1960s, and that policy evolved on an ad hoc, incremental basis. AMOs were devised for personnel actually or potentially exposed to radiation. However, many – probably most – of those deployed during nuclear weapons trials were not considered to be at risk of harmful exposure and therefore would not have been subject to blood counts. As one RAF medical officer stated in October 1957, ‘With regard to personnel on air task groups, the problem is different in that only a limited number require medical examination – aircrew, Regiment and technical personnel engaged in handling radioactive aircraft and stores.’¹³

5.3. The implementation of the relevant AMOs was substantially delegated to unit medical officers, and AHB located hardly any unit-level records showing how they implemented this delegation. Like the policy files, the unit-level records in the AIR classes at TNA focus largely on operational matters, and medical coverage tends to be limited or non-existent. However, the records do suggest that senior RAF medical staff were deeply sceptical about the value of blood testing.¹⁴ After one high-level discussion in 1958, it was reported that ‘RAF medical representation at the meeting did not believe blood counts to be a medico-legal safeguard and, as they are

scientifically worthless done under Service conditions, considered it “immoral” to do them.’¹⁵ Agreement for all personnel deploying to the Maralinga range to have blood counts was only reached in January 1958,¹⁶ after the major weapons trials had been completed, and the vast majority of personnel who deployed on Operation GRAPPLE Y and Z in the same year were not subject to blood counts.¹⁷

5.4. Before operations in 1958 began, the Commander of Task Force GRAPPLE requested that a random percentage – 25 per cent – of personnel from the RAF Christmas Island Establishment and the Reinforcement Party Establishment should have blood counts. AHB has been unable to locate any record that this request was implemented. However, it is recorded that senior RAF medical personnel questioned the need for any such measure for personnel from both Establishments.¹⁸

5.5. The AMOs covering the period 1952 to 1957 did not contain a requirement for unit medical officers to record blood count results in the subject’s F. Med 4. This requirement was subsequently inserted into AMO 129/58 in 1958, but its replacement, AMO 107/63 again failed to stipulate that blood count data should be recorded in F. Med 4. This was only corrected four years later in DCI S.69/1967 (RAF) (see below).

5.6. Clearer direction on blood count policy was reserved for specified groups of RAF personnel, particularly aircrew and groundcrew involved in cloud sampling, and others considered to be at particular risk of exposure to radiation. In such cases, an Operation Order might be issued with a medical annex.¹⁹ Some of these annexes mandated blood counts for the personnel to whom the order applied. All personnel from the RAF balloon unit deployed during Operation GRAPPLE Z should also have had blood counts, according to policy.²⁰ Nevertheless, this still means that we only have a clear picture of the policy on blood counts for a small minority of the RAF personnel deployed on British nuclear weapons trials between 1952 and 1967.

5.7. **AMO A.51/53.** The first RAF policy statement took the form of an Air Ministry Order, AMO A.51/53, which was issued on 19 February 1953. The AMO was entitled ‘Instructions for the storage and use of radioactive sources issued for passive

defence training.’ The order stated that the unit medical officer was to supervise the health standards of all personnel working with radioactive sources. The unit medical officer was to inspect weekly the record of radiation received by personnel. Exposure to radiation above specified levels was to be reported to the Air Ministry (for higher exposure) or the Command medical officer (for lower exposure).

5.8. The unit medical officer was also to arrange for personnel working regularly with radioactive sources to undergo a blood test when he considered this necessary. Such tests were to be repeated at intervals depending on the intensity of the training programme. The AMO contained no instructions on where the blood counts were to be documented: there was no direction to transfer the blood count data to F. Med 4.

5.9. **AMO A.91/53.** A second AMO was issued in March 1953 numbered A.91/53 and entitled ‘Safety regulations for the bulk storage and transport of radioactive materials within the Royal Air Force.’ This reiterated the responsibility of medical officers for supervising health standards of personnel working with radioactive materials and for maintaining the weekly inspection regime. Medical officers were directed ‘to arrange for initial and periodic medical examinations’, which would have included blood counts. Again, there were no instructions to transfer the blood count information to F. Med 4.

5.10. **AMO A.18/55.** A third AMO was issued in January 1955. Numbered A.18/55, it was entitled ‘Storage and use of radioactive sources installed in aircraft and used in servicing certain equipment.’ This document confirmed the responsibility of unit medical officers for supervision of health standards of personnel working with radioactive sources. The medical officer was also to ‘advise when the risks from exposure to the sources during servicing operations are observed to be greater than necessary’. The weekly inspection regime was similarly reconfirmed, as was the reporting process described in AMO A.51/53.

5.11. On blood counts, the AMO stated: ‘The unit medical officer is also to arrange for personnel working regularly with X-radiation or gamma radiation sources to undergo an initial medical examination, including a blood test. Such tests should be

repeated at least annually, but where in the opinion of the medical officer the risk justifies them, more frequent blood tests should be performed.' The AMO did not direct medical officers to transfer the blood count data to F. Med 04.

5.12. **AMO A.129/58.** The situation whereby personnel working with radioactive sources were subject to the provisions of three separate AMOs was obviously unsatisfactory and was recognised as such. It resulted in 'considerable duplication of rules in the instructions'.²¹ To rationalise policy, a new AMO was prepared in 1957 and issued in April 1958.²² Entitled 'Health control of workers exposed to X-rays and radioactive materials', it was numbered A.129/58. It is this AMO that is referred to in the widely publicised 'Gledhill memo', which contains blood count data for Squadron leader Terry Gledhill of 76 Squadron.²³ This document still made no specific mention of nuclear weapons trials, but it differed from previous AMOs by assigning responsibilities to unit commanding officers and not just medical officers. Specifically, the commanding officer of any section where X-ray plant or radioactive materials were being used was to ensure that personnel regularly exposed to radiation were referred to the unit medical officer before starting duty and potentially during the duty period.

5.13. Nevertheless, the prevailing belief was that attendance at a nuclear weapons trial did not in itself mean that personnel would be regularly exposed to radiation. While this AMO was issued in 1958, the vast majority of personnel attending Operation GRAPPLE Y and Z in that year did not receive blood counts. Correspondence from the 1957-58 period reveals significant disagreement between senior RAF and AWE medical staff over the need for blood counts.²⁴

5.14. AMO A.129/58 otherwise tasked unit medical officers to arrange blood counts as part of general clinical examinations. If the blood count of an exposed person fell towards defined warning levels, it was to be repeated weekly; six-monthly blood counts were required for personnel receiving a specified dosage over a six-month period, or for those causing concern for other reasons. Blood counts were also required for personnel receiving specified radiation dosages over seven consecutive days. The unit medical officer was to inform higher medical authorities when

personnel received more than the maximum permissible radiation dose, providing a short written report of the circumstances. The medical officer was also to record the dates when blood counts were taken and the results of the blood counts.

5.15. The AMO provided clear guidance on documentation: 'The officer-in-medical-charge is to record, on Army Form A.21, the dates of medical examinations for fitness for duty with X-rays and radioactive substances, periods of suspension from such duty through medical unfitness, results of blood examinations performed and quantities of radiation received. When an individual is posted to another unit, Army Form A.21, bearing an appropriate enclosure number, is to be forwarded with F. Med 4 (Medical History Envelope).'

5.16. **AP 4687.** The only RAF policy document produced in this period located by AHB that specifically mentioned atomic weapons was an AP. APs did not carry the same weight as AMOs, and their primary purpose was to provide information and instruction on procedure and process rather than explicit orders. AP 4687, published in April 1958, was entitled 'Atomic Weapons: Basic Physics and Radiation Hazards and Detection.' Chapter 2, p.36, para 10 stated that 'Initial blood counts are therefore taken on all personnel employed on work with radioactive material, and afterwards at regular intervals.' However, it should be reiterated that many of those deployed on nuclear weapons trials were not working directly with radioactive material and were not considered to be at risk of exposure.

5.17. A second edition of this AP was issued in March 1961, but the section on blood counts (Chapter 2, para 10) was unchanged.

5.18. **AMO A.107/63.** AMO A.129/58 continued to apply until March 1963, when it was replaced by AMO A.107/63. This was entitled 'The Supervision of personnel working with ionizing radiations.' It stated, 'Personnel classed as radiation workers are to be examined before the commencement of employment and annually thereafter for so long as they are so classed.' The examination was to include a blood count. This was to establish the 'normal' count for the individual at the

commencement of employment and assist in the assessment of subsequent variations.

5.19. The result of the blood count, in the form of a certificate of fitness for employment, was to be forwarded to the unit commanding officer on Form 624 (Sick Report or Medical Inspection Report). Details of both initial and annual medical examinations were to be recorded on RAF Form 43 (devised specifically to record the results of medical examinations). However, AMO A.107/63 did not provide any guidance on subsequent recording of the information contained on either of these forms within F. Med 4. Direction to transfer Form 43 to F. Med 4 was only contained in a separate AMO, which had been issued in 1952.²⁵ As with previous AMOs, there was no mention of nuclear weapons trials, and it cannot be inferred that this AMO's requirement for blood counts would have applied to all personnel deployed for such trials. Again, the application of the AMO was assigned to unit commanding officers and medical officers.

5.20. **DCI S.69/1967 (RAF).** The publication of AMOs ceased in 1964. They were replaced by DCIs. AMO A.107/63 was replaced by DCI S.69/1967 (RAF) in April 1967. This document defined two classes of exposed personnel: Class A received higher exposure to radiation than Class B. However, the system was flexible, and the Director of Health and Research (RAF) could, at his discretion, assign certain individuals or groups of workers to specific classes. Such action had been taken in respect of several groups of workers, including all personnel employed on decontamination tasks. The unit medical officer was responsible for classifying personnel, possibly in consultation with specialists such as radiation safety officers. All Class A radiation workers were to be medically examined before commencing radiation work for the first time or recommencing such duties after an absence of at least four months. Thereafter, they were to be examined annually while they remained on Class A duties, and they were to be examined when they ceased such duties. They could also be examined at the discretion of the unit medical officer. The initial examination was to include a blood count. In the subsequent examinations, blood counts were only deemed necessary when clearly required on clinical grounds, or when workers ceased Class A duties.

5.21. The results of all clinical examinations were to be recorded on F. Med 142. Blood examinations were to be recorded on F. Med 12 (Request for Special Examination). Separate instructions required F. Med 12 to be transcribed on to F. Med 7 (Out-Patient Record), which was to be entered as an enclosure into F. Med 4.²⁶

5.22. **Specified formations and units.** For particular categories of RAF personnel, clearer policy direction was located. The Bomber Command Operation Order for Operation GRAPPLE Z in 1958 stated that all Bomber Command personnel deploying for the operation should be subject to blood counts, and this direction was also captured in medical correspondence in the same year. This order primarily applied to 76 Squadron personnel involved in cloud-sampling missions.²⁷ Blood counts were also mandated for the RAF balloon unit deployed during Operation GRAPPLE Z, as noted above.²⁸

5.23. However, even the implementation of this policy was not straightforward. In November 1957, one medical officer reported on the practical difficulties involved in ensuring that all RAF personnel who were liable to be exposed to radiation had a blood count before deployment. He wrote, 'I am at present making certain that all air force personnel who are liable to be exposed to radiation have a medical examination and the necessary blood examination beforehand, and I am finding this difficult for personnel posted to the various Air Task Groups ... The beginnings of these Task Forces are so often cloaked in secrecy that they are well under way before outside branches know that they have been formed.'²⁹

5.24. The capacity of medical facilities in theatre was sometimes stretched. Medical records consulted during the discovery exercise confirm that blood counts were often administered in theatre, but RAF and AWE documents also record a lack of suitable medical provisions at some locations. In October 1957 it was reported that 'No facilities for blood counts exist at Maralinga.'³⁰ Another document from July 1958 notes that 'No facilities exist at present at Christmas Island for this type of test.'³¹

Hence, it is likely that at least some personnel who should have been subject to blood counts did not actually receive them.

6. Personal and medical records

6.1. The 200 Records of Service consulted by AHB produced no information of relevance to the discovery exercise. They contain only basic recruitment, posting, rank and personal information.

6.2. RAF medical records are dispersed across a range of file groups. Some are held in personal files, but many personal files only contain personal/service information. The standard British service medical file was F. Med 4, but there was also a Central Medical Envelope designated F. Med 29, which contained index cards for the documents that would have been contained in F. Med 4. When the document recording the blood count was inserted into F. Med 4, the index card for that document was sent to the Air Ministry (and later the Ministry of Defence) for insertion into F. Med 29.³² AHB record requests to Restore produced F. Med 4s for some personnel and F. Med 29s for others. The reason for this apparent lack of consistency in record keeping has yet to be established.³³

6.3. During the period covered by the discovery exercise, the RAF was reduced in strength by 146,700 personnel, a figure equating to 54 per cent of its strength in 1952.³⁴ Thousands of other personnel would have left RAF service through normal turnover. It is likely that many personnel who participated in the atmospheric trials between 1952 and 1958 had left RAF service by 1967. Consequently, a significant proportion of the RAF medical records within the scope of the discovery exercise would have been 60-70 years old.³⁵

6.4. AHB's research on personal and medical records was substantially directed towards 97 personnel who served with 76 Squadron during Operation GRAPPLE Z in 1958 and 79 personnel of the RAF balloon unit deployed to Christmas Island during the same operation. This focus was entirely dictated by the policy records, which confirm that all personnel from these units should have had blood counts.

Beyond this, AHB's sample was based on 140 personnel from the RAF Blue Books – an AWE record of personnel deployed during the nuclear weapons trials.³⁶ The obvious disadvantage here was the absence of any record of the policy that was applied to these latter personnel at unit level. The total sample numbered 316 – approximately 3.75 per cent of identified RAF personnel who participated in British nuclear weapons trials between 1952 and 1967.³⁷

6.5. AHB examined a total of 252 files or 80 per cent of the dip sample. This reduced number reflected growing experience with RSWeb. It was possible to discount certain files on the basis that they were only likely to contain personal or service information – not medical information.

6.6. AHB located medical records for 19 personnel from 76 Squadron, 6 from the balloon unit and 40 from those identified in the Blue Books – a total of 65 or about 20.6 per cent of the original sample.

6.7. Of the 65 medical records, 34 (52.3 per cent) contained blood count records, while 31 contained no record of any blood counts.

6.8. Of the 6 balloon unit records, 3 (50 per cent) contained blood count data, all of which was recorded during Operation GRAPPLE Z.

6.9. Of the 76 Squadron records, 13 (68.5 per cent) contained blood count data. 8 (42.1 per cent) contained data recorded in 1957 to 1958, during the atmospheric trials, while 5 (26.3 per cent) contained data from blood counts administered in later years.

6.10. Of the records for personnel listed in the RAF Blue Books, 16 (40 per cent) contained blood count data, including data collected from blood counts before and after UK atmospheric testing had ended.

6.11. Of the 34 records that contained blood count data, 12 (35.3 per cent) recorded blood counts taken shortly before deployment or on arrival at the deployed location,

but no subsequent blood counts. 10 (29.4 per cent) did not contain a record of an initial blood count before the nuclear trial but recorded one or more blood counts afterwards. 10 (29.4 per cent) recorded an initial blood count before the nuclear trial followed by one or more subsequent counts. The remaining two files contained ambiguous information.

7. Possible reasons for the absence of medical records

7.1. Some older records held at Restore are not shown on RSWeb. To identify these, Restore would have to search for each file individually and would require full names, service numbers and dates of birth for each of the servicemen concerned. This information would have to be compiled from Records of Service.

7.2. Some medical records have been destroyed: AHB identified 6 files from the sample of 316 that were held by Restore but mistakenly destroyed on direction from Defence Business Services in 2023. Further investigation would be required to establish whether any of the sample files not shown on RSWeb have been destroyed.

7.3. Information supplied by RAF Disclosures indicates that some medical records have been removed from the Restore archive and its predecessors to process pension claims and have not been returned.

7.4. In more recent times, provision has existed to transfer veterans' medical records from Defence to the NHS. The possibility that such transfers have contributed to the apparent absence of NTV medical records should be considered.

8. Possible reasons for the absence of blood count records.

8.1. Until more RAF medical records are located, conclusions about the absence of blood count data can only be provisional. However, the research so far undertaken suggests three potential reasons why blood count data is missing: recording, practicalities and policy.

8.2. **Recording.** The AMOs that covered personnel working with radioactive sources contained no requirement to enter blood count results into F. Med 4 until 1958.

Indeed, the earlier AMOs contained no guidance at all on documenting the blood count results.

8.3. As RAF personnel did not deploy with F. Med 4 (except when posted to permanent overseas bases), blood counts taken in theatre would have had to be returned to the UK (or overseas bases), and it is entirely possible that some records were not sent back or were lost in transit.

8.4. Some medical staff may have questioned the necessity to retain records of routine blood counts that produced normal results. The different approaches employed by unit medical officers were reflected in two files inspected by AHB. One of these identified its subject as a radiation worker, as defined by AMO A.107/63, and contained four blood counts over a span of six years. Another contained a blood count record from 1970. A note on the file stated that the subject had worked with radioactive substances for fifteen years and had received multiple blood counts during that time, all of which had been normal. Not one of these counts appeared in the file.

8.5. **Practicalities.** Personnel who should have been subject to blood counts in accordance with policy did not all receive them. As previously noted, difficulties were experienced in identifying the relevant personnel before deployment, and medical facilities in theatre were sometimes limited.

8.6. **Policy.** While policy dictated that personnel from 76 Squadron and the balloon unit should have received blood counts, no equally clear policy applied to the personnel selected from the RAF Blue Books. It is likely that some did not receive blood counts because unit medical officers did not believe they would be (or had been) exposed to harmful levels of radiation.

9. Key findings

9.1. RAF policy on blood counts was chiefly based on predicted or recorded radiation exposure and not simply on attendance at nuclear weapons trials. Many RAF personnel who attended these trials did not receive blood counts.

9.2. The implementation of RAF policy on blood counts was substantially delegated to unit medical officers, and their interpretation and implementation of policy is not recorded in detail.

9.3. Certain specific RAF units were subject to higher-level direction requiring that their personnel should all receive blood counts due to the likelihood of exposure to radiation. However, they represented a small minority of the total number of personnel deployed.

9.4. RAF policy evolved in an ad hoc, incremental manner, via three separate AMOs. It was not consolidated into a single AMO until 1958 when, however, only a small minority of personnel deployed on Operation GRAPPLE Y and Z received blood counts.

9.5. RAF policy covering personnel exposed to radioactive sources did not specify that blood count data should be transferred to F. Med 4 until 1958.

9.6. The standard of RAF medical record keeping for records dating from the 1952-1967 period did not facilitate AHB's contribution to the discovery exercise. An unknown number of older records were not shown on RSWeb and could not be located within the period of the exercise; records have also reportedly been removed to process pension claims, and some have been destroyed.

9.7. Just over half the medical records examined contained blood count data. Most blood counts were either taken just before deployment or involved one count before the nuclear trial followed by one or more subsequent counts.

9.8. The absence of blood count information in medical records probably results from (1) a failure to transfer data on to F. Med 4, (2) practical problems implementing blood count policy and (3), for personnel selected from the Blue Books, the fact that policy did not require many RAF personnel deployed during the nuclear weapons trials to receive blood counts.

Annex A

Maximum Permitted Exposure and Definition of 'Radiation Worker'

AMO A.51/1953

Usage.

The maximum tolerance dose to which personnel are to be exposed in peace is not to exceed .1 roentgen (100 milliroentgen) for each working day, or .5 roentgen (500 milliroentgen) for each working week, whichever is the less.

Responsibility of Unit Medical Officers. Unit medical officer was instructed to inspect weekly the record of radiation received by personnel; 'should any have been exposed to radiation in excess of 500 milliroentgen a week, he is immediately to report the details by signal to the Air Ministry (D. of H.).'

AMO A.91/1953.

Exposure of Personnel to Radiation.

No individual is to be subjected to doses of radiation exceeding 0.1 Roentgen (100 milliroentgen) for each working day, or 0.5 roentgen (500 milliroentgen) for each working week, whichever is the less. The dose of radiation received by an individual is the total of the effect of successive exposures to radiation, and is measured by individual dosimeters and recorded on personal records.

AMO A.18/1955.

Usage.

All personnel regularly working with, or in close proximity to, sources of X-rays, or gamma rays, are to be equipped with a serviceable personal dosimeter, the use and reading of which must be understood by the wearer. The maximum tolerance dose of X-radiation or gamma radiation to which personnel are to be exposed is not to exceed 0.1 roentgen (100 milliroentgen) for each working day, or 0.3 roentgen (300 milliroentgen) for each working week...

The maximum permissible dosage for beta radiation for a part of the body such as the hand, is 0.3 rep per day or 1.5 rep per week. No personal dosimeters are used on connection with beta emitters as the handling techniques afford safety...

AMO A.129/1958.

Safety standards.

The maximum permissible dosage of radiation to which personnel may be exposed is 0.1 rad (or roentgen) a day, and not more than 0.3 rad (or roentgen) in any consecutive period of seven days. These levels will be amended from time to time as required and are to be exceeded only with the agreement of the Director of Hygiene and Research, Air Ministry.

The limits below which personnel may handle, without hazard, equipment contaminated with radioactive material are, for fixed activity, fifty counts a second, and for loose activity, five counts a second, the readings in each case being taken with AERE type monitor 1257 or 1320.

Medical Examinations.

The following white cell levels are considered to be critical when found in exposed personnel:-

	Normal	Warning Level	Rejection Level
Neutrophils	2,500 to 7,500	3,000	2,000
Lymphocytes	1,500 to 3,500	1,000	750
Total leucocytes	4,000 to 10,000	4,500	3,000
Abnormal cells	Nil	Nil	Present

When a person has been exposed to radiation exceeding 0.3 rad (or roentgen) over seven consecutive days he is to be medically examined and is to receive no further exposure until the dose over a period of thirteen weeks does not exceed 0.3 rad (or roentgen) a week.

AMO A.107/63.

Categories of Exposure.

Incidentally exposed – those receiving less than 1.5 rems per annum. Apart from occasional verification that the dose received is likely to be less than 1.5 rems per annum, no further supervision need be exercised.

Radiation workers – those receiving or likely to receive more than 1.5 rems per annum. Their maximum dose is not normally to exceed 5 rems per annum. Although this may be increased to 3 rems per calendar quarter (that is a possible total dose of 12 rems in a year), their radiation dose, in rems is not to exceed five times the number of years by which their age exceeds 18.

DCI S.69/1967.

Classification of Exposed Personnel.

Personnel who, in the course of their routine duties, are likely to be exposed to ionizing radiations are known as radiation workers; every effort is to be made to keep their numbers as low as possible. Radiation workers are to be classified into two groups, according to their probable exposure experience:

- a. Class A Radiation Workers. Those receiving, or likely to receive, a whole body dose of more than 1.5 rems per year. Their maximum whole body dose is not to exceed 5.0 rems in any one year but they may receive up to a maximum of 3.0 rems in any one 13-week period...
- b. Class B Radiation Workers. Those receiving, or likely to receive, a whole body dose of less than 1.5 rems per year. Their maximum whole body dose is not to exceed 1.5 rems per year but they may receive up to a maximum of 1.0 rems in any one 13-week period.

The total accumulated body dose (D) for any radiation worker aged N years is not to exceed that given by the formula, $D = 5(N-18)$ rems...

Surface Contamination.

Personnel are to be categorized as class A radiation workers if they work for more than 2,000 hours per year in close contact with extensive surfaces bearing loose contamination of activity, averaged over an area not exceeding 1,000 sq cm, greater than:

- a. 10^{-4} micro-curies per sq cm of any beta emitter (including beta/gamma sources), or low toxicity alpha emitter...; or
- b. 10^{-5} micro-curies per sq cm of any other alpha emitter.

Workers are to be assigned to class B if their exposure does not, or is unlikely to, exceed three-tenths of that permitted to a class A worker.

These levels of activity may be increased by a factor not exceeding $\times 10$, in direct proportion to any decrease in the number of hours exposure per year.

Notes

1. The minor trials at Maralinga were ground-based, while the Nevada detonations were underground. Residual RAF participation chiefly took the form of air transport. Cloud-sampling missions normally involved small RAF detachments of aircraft, aircrew and groundcrew; detachments typically numbered between 100 and 130 personnel.
2. These dates aligned with the eligibility criteria for the UK Nuclear Test Medal when the discovery exercise started; the medal criteria have since been extended to cover cloud-sampling and other missions after 1967.
3. BBC News, *Defence Secretary to seek 'missing' nuclear test records*, 21 November 2024, <https://www.bbc.co.uk/news/articles/cq7q4z0jxneo>
4. RSWeb is the database for records held on the MOD's behalf by Restore PLC.
5. The Caldicott principles apply to the use of confidential information within health and social care organisations and when such information is shared with other organisations and between individuals, both for individual care and for other purposes.
6. Other significant tasks undertaken by AHB during the period of the discovery exercise included support to the Afghanistan Inquiry, support to MoD Legal litigation relating to the Mull of Kintyre Chinook crash, and support for commemorative activities relating to VE-Day 80, VJ-Day 80, Battle of Britain 85 and the centenary of the University Air Squadrons. AHB typically handles between 1,500 and 2,000 enquiries per year, including hundreds of FOIA requests. Tasking during 2025 also included parliamentary support for the former MinVP, information and imagery support to RAF organisations involved with the veterans community, such as the RAF Benevolent Fund and the Royal Air Forces Association, and extensive research in support of extending eligibility for the Nuclear Test Medal. AHB also provides research and information support to the Joint Casualty and Compassionate Centre and the Commonwealth War Graves Commission.
7. The RSWeb database uses a system of three-letter prefixes for each record. Records with the XME and XFM prefixes proved most likely to contain medical information.
8. AHB, Air Ministry Order A. 423/50, 6 July 1950.
9. AHB, Air Ministry Order A.209/52, 10 April 1952. This referred to 'a result of a medical examination [to be recorded on RAF Forms 43 and 42 (the latter being added to the candidate's F. Med 4)]'.
10. Two tests conducted during Operation GRAPPLE Z involved detonations from barrage balloons rather than air drops.
11. Extract from CAFO Issue 17/58 dated 1 August 1958, CAFO 81, Nuclear Weapons Trials parties – Blood Examinations, https://assets.publishing.service.gov.uk/media/661667a26ad004cd0fac0533/Safety_Regs04_076_Redacted.pdf (accessed 5 January 2026).

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12. A8/233/CAA, 27 November 1957,
https://assets.publishing.service.gov.uk/media/6616a0285a583be6bb09322c/01000111_prop_redact_Redacted.pdf (accessed 5 January 2026).
 13. UK National Archives (TNA) AIR 2/14786, Enclosure 24A, 31 October 1957.
 14. GRA/104/6/Org, 9 July 1958,
https://assets.publishing.service.gov.uk/media/66169bd33fe61a4f683ea7ca/05007831_Redacted.pdf (accessed 22 October 2025).
 15. GRA/104/6/Org, 17 July 1958,
https://assets.publishing.service.gov.uk/media/661673913fe61a4f683ea784/Grapples17_028_Redacted.pdf (accessed 22 October 2025).
 16. 'Maralinga – Requirement for Blood Counts', 4 February 1958,
https://assets.publishing.service.gov.uk/media/6616674056df202ca4ac0535/05001068_prop_redact_Redacted.pdf (accessed 22 October 2025).
 17. GRA/104/6/Org, 2 July 1958,
https://assets.publishing.service.gov.uk/media/66169bd33fe61a4f683ea7ca/05007831_Redacted.pdf (accessed 22 October 2025).
 18. TNA AIR 2/14786, Enclosure 83A, 10 January 1958.
 19. TNA AIR 2/14786, Enclosure 83A, 10 January 1958; Headquarters Bomber Command Operation Order No. 26/58, Operation "Grapple Z", 25 June 1958.
https://assets.publishing.service.gov.uk/media/66169ca05a583be6bb09321e/ES010651_007_Redacted.pdf (accessed 22 October 2025).
 20. GRA/104/6/Org, 17 July 1958,
https://assets.publishing.service.gov.uk/media/661673913fe61a4f683ea784/Grapples17_028_Redacted.pdf (accessed 22 October 2025).
 21. TNA AIR 2/14786, Enclosure 20A, 30 October 1957.
 22. TNA AIR 2/14786, Enclosure 28A, 5 November 1957.
 23. BBC News, '*Starmer – meet us before it's too late*,' *Nuclear test veterans say*, 18 November 2024, <https://www.bbc.co.uk/news/articles/cy4ng2873jro> (accessed 2 December 2025).
 24. AIR 2/14786, Enclosure 83A, 10 January 1958; GRA/104/6/Org, 9 July 1958;
https://assets.publishing.service.gov.uk/media/66169bd33fe61a4f683ea7ca/05007831_Redacted.pdf (accessed 22 October 2025).
 25. AHB, Air Ministry Order 209/52, 10 April 1952.
 26. TNA AIR 10/5638, AP 1269, Administration for Medical and Dental Officers, Air Ministry, July 1960, Chapter 3, p. 49, para 50.
 27. TNA AIR 2/14786, Enclosure 83A, 10 January 1958; Headquarters Bomber Command Operation Order No. 26/58, Operation "GRAPPLE Z", 25 June 1958,

https://assets.publishing.service.gov.uk/media/66169ca05a583be6bb09321e/ES010651_007_Redacted.pdf (accessed 22 October 2025).

28. GRA/104/6/Org, 17 July 1958,
https://assets.publishing.service.gov.uk/media/661673913fe61a4f683ea784/Grapples17_028_Redacted.pdf (accessed 22 October 2025).

29. TNA AIR 2/14786, Enclosure 35A, 11 November 1957.

30. TNA AIR 2/14786, Enclosure 21A, 31 October 1957.

31. GRA/104/6/Org, 17 July 1958,
https://assets.publishing.service.gov.uk/media/661673913fe61a4f683ea784/Grapples17_028_Redacted.pdf (accessed 22 October 2025).

32. TNA AIR 10/5638, AP 1269, Administration for Medical and Dental Officers, Air Ministry, July 1960, Chapter 2, p. 45, para 28.

33. A possibility is that record policy has at some stage involved rationalisation so that F. Med 4s or F. Med 29s were retained, but not both.

34. Hansard, RAF Manned Strength, Vol. 767, debated on 2 July 1968,
<https://hansard.parliament.uk/commons/1968-07-02/debates/4cc0aa38-b62e-4226-9476-7d45673b49c9/RafMannedStrength> (accessed 2 December 2025).

35. For example, while the Operation GRAPPLE Z balloon unit was an important focus of AHB research for the discovery exercise, the RAF's final balloon elements were disbanded in February 1960, and many personnel were probably discharged at that time or soon afterwards. See AHB, Monthly Record Office Return of Establishment and Mustered Strength of Ground Personnel by Trades, Stats. 1204 (PW), 1 January to 1 December 1960.

36. The Blue Books were compiled between 1981 and 1982 by AWE using information from documents that had been written during the period that the nuclear weapons test programme was undertaken. The books did not form a complete list of personnel who attended the trials (no complete list was ever compiled). In 1982, the AWE list was sorted by name and service and printed off in a series of documents which were bound in blue covers.

37. Early in the discovery exercise, AHB plans for researching the medical files were based entirely on personnel listed in the RAF Blue Books and envisaged a sample of 171 personnel divided into 3 groups of 57, grouped by high, medium and low recorded radiation exposure. After the lack of clear blood count policy was established, the sample was revised to incorporate the 97 personnel from 76 Squadron and the 79 personnel from the balloon unit. Of the original Blue Book sample of 171, one proved to be an Australian and 30 more were 76 Squadron personnel. The sample drawn from the Blue Books was therefore reduced to 140. The total sample based on 76 Squadron (97), balloon unit (79) and the Blue Books (140) therefore amounted to 316.