INTRODUCTION

The Australian Atomic Energy Commission (AAEC) came into existence by the passage of an Act of Parliament in 1953 and as an organisation ceased to exist, again by an Act of Parliament, in 1987. It was replaced by a different organisation; the Australian Nuclear Science and Technology Organisation (ANSTO). The AAEC and its successor organisation ANSTO have generated more controversy and have had a greater fluctuation in fortunes than their 'sister' organisation, the CSIRO. The AAEC was established in a period of excitement in which science and technology were seen to be the vehicle by which nations could achieve the desired riches of high technology that were seen as essential in modern life. This is a short history of the Australian Atomic Energy Commission.

The United Kingdom Atomic Energy Agency (UKAEA) and the United States Atomic Energy Commission (USAEC) both have official histories. Margaret Gowing's work on the UKAEA is a three volume history[i] which traces the development of the organisation from both a political and scientific perspective. The USAEC has an even longer and more detailed history which runs to some four volumes, each of which has been written by teams of authors[ii]. Both these histories were commissioned by their respective organisations and in both cases the authors of these histories have had access to vast archival material to assist them in their work. A history of the development of nuclear power in France[1] has also been written recently and this also is a detailed and long document.

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[i] Gowing, M 'Britain and Atomic Energy; 1939-1945' Macmillan and Co Ltd London 1964, 'Independence and Deterrence; Britain and Atomic Energy' Volumes 1 and 2 Macmillan London 1974

[ii] Hewlett, R and Anderson, O 'The New World,1939-1946, Volume 1, A History of the USAEC' Pennsylvania University Press Pennsylvania 1962, Hewlett, R and Duncan, F 'Atomic Shield 1947-1952, Volume 2, A History of the USAEC' 1969

The Australian Atomic Energy Commission (AAEC) lacks such a history. A history of the Commission had been commissioned by Professor Max Brennan (b1932), the last Chairman of the AAEC:

> '*the Commissioners ... decided that it would be a good idea to have a history written of the Commission ...There had been a history done of ... the USAEC and we all felt the Commission was fairly special in Australian scientific and political history for a whole variety of reasons. And so we agreed to do that and we started down the track of having Professor Roy McLeod do the job, and we set it up ... and things began, but the ANSTO Board, when it came into existence, decided that it was a frivolity and too expensive and so pulled the plug on funding. So as a result Roy had to look for other sources of funds ... he got some funding from ... the Australian Research grants Committee ... but that money stopped and so Roy was never able to complete the history to the level of detail that he had originally wanted*'[2].

The official history of the AAEC has never been written. The circumstances under which it was commissioned and then languished, as related by Max Brennan, may be regarded as the last sorry chapter of a Greek Tragedy which opens with a hopeful and excited overture. The First Act begins with a hopeful view to a future not just for the organisation but a nation on the verge of greatness. But these events then quickly move from one disaster to the next until in the end even the recounting of the story is thwarted. In this Greek Tragedy the Gods of Olympus have been transformed into the political leaders of Australia. The principal mortals are the scientists who worked within the Commission and who became the mere playthings of these squabbling petulant gods. The weapons that these gods used were the funding of projects which were started or stopped purely at their whim with scant regard for the work that had been done or could be achieved.

Five attempts have been made to make a written record of the Commission, of these two were written by historians (Alice Cawte and Ann Moyal) and hence are written by observers to the events that transpired. Neither of these historians has a technical background and hence their work is limited to reporting and analysing the political background. Little attention is paid by these authors to the scientific work carried out within the Commission and the significance of this work.

The other three were written by two of the scientists (Keith Alder and Clarence Hardy) who were players in the drama itself. These works are, in essence, reminiscences of their involvement in the unfolding drama. They contain valuable material which is not readily available from other sources, but both these authors have not used the political and archival materials available. The five works complement each other but none gives a comprehensive overview of the Commission or the impact of the work carried out by the Commission had on Australian society.

Keith Alder (b1921) who had been both a Commissioner and Executive Director of the Commission wrote '*Australia's Uranium Opportunities*' and published it in 1996[3]. This is an account of the scientists and their work within the Commission during the period of his employment, some thirty years from the time when he was a new recruit to his retirement. The work is a personal and passionate account of this period and can be best summarised by the subtitle of the book '*How her Scientists and Engineers Tried to Bring her into the Nuclear Age but were Stymied by Politics*'. Alder's strong emotions in choosing this subtitle can be seen as the product of the effects of political interference in the workings of the Commission which was established as an autonomous organisation.

Clarence Hardy (b 1931) wrote two accounts of the Commission; the first, '*Enriching Experiences*'[4] dealt primarily with the uranium enrichment project in which he was involved. Hardy's second book, '*Atomic Rise and Fall*', was a history of the AAEC which he developed from the Annual Reports of the AAEC, interviews with colleagues and other public documents. It is not a history in a scholarly sense but more of a memoir[5]. Both of Hardy's books give an overview of the events that affected the Commission and the contributions that the Commission made to a wider scientific community. Neither can compare with the detail and historical rigour of the official histories of either the UKAEA or the USAEC and they were not meant to. Hardy was putting forward a scientist's view of these events so that at least part of the story could be recorded.

The works of Alder and Hardy were probably developed in response to the two other historical accounts of the Commission. Alice Cawte's (b1961) 'Atomic Australia'[6] was published in 1992 and is essentially a historian's work. It is well researched and was until that time the first scholarly work to utilise the material made available through the National Archives of Australia. Written by a historian and not a scientist, the book presented a view of Australia's entry into the atomic age through the use of historical documentary sources only. Her work focuses on uranium policy and the development of atomic energy as a possible means to obtaining nuclear weapons. Her work is not a history of the Commission. Any mention of the Commission and the functions of the Commission are only incidental to the main structure of her work.

The final work is that of the well-respected Australian historian of science, Ann Moyal. Her work '*The Australian Atomic Energy Commission: A case study in*

Australian Science and Government' was published in the journal '*Search*' in 1975 and was the first published history of the Commission. Moyal, in 1975, did not have access to the archival material available to Cawte, and hence Moyal had to rely on the Commission's Annual Reports and interviews with a number of key players in the drama, both politicians and scientists. She is essentially an historian not a scientist and her work is completely focused on the Commission and its work.

At the beginning of her paper Moyal asks a number of questions;

> '*How does an industrial nation go about framing a nuclear policy?*
> *How does a country with specific resources for the development of scientific research and development make its determinations about the allocation of a proportion of those resources to a major institution of training and research?*
> *Where are the policies and decisions made?*'[7]

She then goes on to ask even more questions;

> *'Is the AAEC a viable institution?*
> *Is it a White Elephant?*
> *Has it a rationale, and a future in the present age?*
> *Has it been accountable?*
> *Or has it evolved, expanded, reorganised, changed direction, consumed funds, used and produced talent, and ultimately marked time, behind closed political and administrative doors?*
> *Why have its work, its accomplishments and failures, not been subjected to public scrutiny?*[8]

Moyal then claims that her study would attempt to answer these questions. Unfortunately she does not manage to answer them all. Her strong criticism of the Commission claims that '*the AAEC has not consolidated the goals and*

purposes which were set for it[9]. However she does not state what these goals were. Moyal's work is scholarly but limited because many files from the National Archives were not available to her. Further she has appeared to judge her subject before she has adequately argued her case and hence much of her argument is of a confrontational nature.

Each chapter of this work could itself be developed into a book length publication if resources and time were devoted to it. But having said this, it is intended to be a scholarly work and will hopefully act as beacon to illuminate the scientific contributions made by a group of individuals who worked through a fascinating period in an organisation which has been criticised by too many within the Australian community.

The first two chapters are, in effect, the pre-history of the Commission. The first chapter is dedicated to Marcus Oliphant who more than any other individual was responsible for the world becoming acquainted with atomic energy in the form of the atomic bomb. He was its first advocate during the early days of the Second World War. It was Oliphant who kept the ideas alive and the scientific workers around him motivated. It was Oliphant, too, who felt inspired to bring Australia into the atomic age at a time when the US was only beginning to see the significance of this energy source. Oliphant, once the war had ceased, became totally opposed to the use of atomic energy for military purposes but he always remained a strong advocate of the peaceful uses of this technology.

The men of vision, referred to in the second chapter were Ben Chifley, 'Nugget' Coombs and 'Doc' Evatt who together saw a vision for Australia even during the darkest days of the war. This vision was that of a prosperous land in which there was full employment and new industries developed in rural

towns which now could grow with the increased wealth brought about by irrigation. The parched inland areas of Australia would grow food in abundance. The population was not just well fed but trained and educated so that the nation as a whole could then take the next leap and become a world power in the southern hemisphere. Atomic energy was to be the power source and the Australian Atomic Energy Commission would help in the delivery of this power source.

The chapters dealing with the Commission then follow. The structure of these is similar, with the political and administrative machinations being dealt with first and the scientific achievements discussed later. This, in effect, means that some issues are mentioned twice within the same chapter, but in these cases the issues are viewed from different perspectives. The focus of each chapter is on a specific aspect of the work carried out during that particular period of time. Each chapter will also discuss those issues that impinge on the Commission during the period under discussion such as the Non-Proliferation Treaty and Project Plowshare. Some projects such as enrichment which was undertaken over a long period of time, will be discussed in detail in one chapter only, but reference will be made to the work wherever it is relevant. Other projects such as the radioisotope work and neutron diffraction which were carried out continuously from the inception of the Commission will not be referred to specifically except where they pertain directly to the narrative. This is not to downgrade the work done in these areas but through necessity since both areas are fertile grounds for histories in their own rights. This type of structure means that there will be some repetition within a chapter although this will be alleviated as far as possible by cross-referencing the discussion.

Chapter 4 will focus on the Beryllia Project. This project was to many the Commission's finest hour and to others the first of its many failures. To work on a project which ultimately is cancelled because the material has been found to be unsuitable for use in a reactor is hardly a failure. This work was definitive. The first decade of the Commission existence was a period in which many ideas were being considered, the Beryllia Project was only one of many activities with which the Commission was involved. These included the purchasing of the Commission's two reactors. The Australian scientific community also wanted access to these reactors which ultimately led to the establishment of the Australian Institute of Nuclear Science and Engineering (AINSE).

Chapter 5 will discuss the Jervis Bay reactor project. There was little public debate and no discussion concerning this project, which was abandoned on the eve of the tender documents being signed, for little more reason than that the new Prime Minister, William McMahon, was against the project from the beginning. During the period that this project was under consideration, other projects were also being considered by the Commission. These included uranium enrichment, possible production of heavy water and an exploration into other aspects of the nuclear fuel cycle.

The Commission then had no new projects with which to continue. But the government would give the Commission more work than it needed. The Commission would become to all intents and purposes a mining company at the government's decree. The Commission would now not only prospect for uranium, but would own shares in one mining company and be a major shareholder in another. The Commission was attempting to reinvent itself. Within a year of its new status the Commission would again be expected to

change direction and divest itself of all its mining obligations, again at the edict of the new Prime Minister, Malcolm Fraser.

The Commission then underwent more reviews than was healthy or productive for the organisation, culminating with the demise of the Commission and the birth of a new organisation located at the same site and employing the same staff as the Commission. This new organisation, the Australian Nuclear Science and Technology Organisation (ANSTO), would itself not be free from interference. The first Board, together with its Chairman and the executive director, would all be dismissed before the turn of the Century.

The Conclusion will attempt to answer the questions which Moyal had asked so many years before. There will also be some recommendations for the broader Australian community. Any organisation which has been set up by government for a specific purpose and is funded from the public purse is not protected from the machinations of government and is subject to the public perceptions of its value and the quality of the work carried out within it. It was thus for the AAEC.

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[1] Hecht, G 'The Radiance of France; Nuclear Power and National Identity after World War II' MIT Press, Cambridge Massachusetts 1998
[2] Brennan interview with Binnie 2000
[3] Alder K. 'Australia's Uranium Opportunities' Pauline Alder, Warrawee N.S.W., 1996
[4] Hardy C. 'Enriching Experiences, Uranium Enrichment in Australia 1963-1996' Glenhaven Publishing, Peakhurst 1996
[5] Hardy C. 'Atomic Rise and Fall' Glen Haven Publishing, Peakhurst NSW, 1999
[6] Cawte, A. 'Atomic Australia 1944-1990' New South Wales University Press, Kensington 1992
[7] p 365 Moyal, A 'The Australian Atomic Energy Commission: A case study in Australian Science and Government' in 'Search' Vol 6 No9 September 1975 p365-384
[8] ibid
[9] ibid

1 OLIPHANT; A FINGER IN MANY PIES

1.1 Introduction

Sir Marcus Oliphant (1901-2000), perceived by several generations of Australians as the kindly public face of Australian physics, may be regarded as the individual who introduced the concept of an atomic[iii] bomb to the world. Oliphant did not discover fission[iv], nor did he work on the fission process, but he was responsible for bringing together the people and the information required for the development of both the atomic bomb and civil atomic energy. Yet he was a man noted later for speaking out publicly against nuclear weapons, so how can these two statements be reconciled?

The world in the late 1930s and early 1940s was a very different place from what exists today and individuals and their actions should be judged against the values of that period. Western Europe was at war. Some of the most gifted physicists of the time were refugees in Britain and the US, for the simple reason that they or members of their families were Jewish. Britain was essentially fighting for its survival as a nation when the war expanded further with the Japanese attack on Pearl Harbour. The entire world was now truly at war. Anyone facing the prospect of their family and country being threatened by an invader would do all they could to protect their family, way of life and country; Marcus Oliphant was no different.

Oliphant had been living in Britain at the outbreak of the war and he had no hesitation about becoming involved with the work of war. It was his war work, his position as Professor of Physics at Birmingham University, and his

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[iii] The tern 'atomic' is used since this is the terminology used in the 40s and 50s. The phenomenon of atomic energy is now termed 'nuclear' since the reactions occur within the nucleus of the atom. The terms atomic energy and nuclear energy will be used interchangeably in this work.

[iv] see Appendix 2

Cavendish network of colleagues that gave him access to those in positions of authority that would bring about Britain's commitment to develop the atomic bomb. After the war, Oliphant returned to Australia and became an advocate of the civil uses of atomic energy. He especially espoused the development of an atomic power station and a desalination plant in the Port Pirie region of his native South Australia. He later became involved with the Industrial Atomic Energy committee and it was through his impatience and the actions that resulted from this that lead to the establishment of the Australian Atomic Energy Commission. So while he was never a Commissioner and was never employed by the Commission, his influence in the development of Atomic Energy in Australia is such that he can be considered as playing a major role.

In short Marcus Oliphant, through his willingness to talk to people, and his ability to communicate with scientists, politicians and government functionaries, was a central player in some of the more dramatic episodes of Twentieth Century science. He was in many ways 'the right man in the right place at the right time'.

1.2 The New Man at the Cavendish

In 1927, Oliphant arrived at the Cavendish Laboratory in Cambridge as an 1851 Exhibition Scholar[1]. He was a young married man from the then semi-rural city of Adelaide. He came to work with the legendary Ernest Rutherford (1871-1937), who over the years would become Oliphant's father figure and mentor. Oliphant was to spend the next ten years at the Cavendish working with Rutherford and coming under the influence of and associating with the other gifted young men there. These young men included James Chadwick (1891-1974) and John Cockcroft (1897-1967) who would both play major

parts in the development of atomic science. Cockcroft would also become a close personal friend to Oliphant.

Oliphant's early work at the Cavendish involved an investigation of the radioactivity[v] of potassium and work on the bombardment of metallic surfaces[2] by positive ions[vi]. When Cockcroft and Walton (1903-) managed to spilt an atom of lithium using protons[vii] from an accelerator[viii], Rutherford suggested that he and Oliphant should further this work[3]. Oliphant set out to design and build a linear accelerator[ix] which would produce more protons but these protons would be less energetic than those produced by Cockcroft and Walton[4]. Oliphant's lifelong involvement with accelerators and accelerator technology appears to have come from this simple suggestion of Rutherford. This also marked the beginning of a happy collaboration between Rutherford and Oliphant.

Oliphant's work with Rutherford lead to the discovery that when deuterium[x] nuclei are used as projectiles as well as targets, they could interact to produce a new form of hydrogen, tritium[xi]. These were the first fusion reactions recorded[5]. While Oliphant enjoyed his time at the Cavendish, he wanted to follow his own directions and not always be subordinate to someone else, so when the opportunity presented itself, Oliphant was ready to leave. By the time Oliphant left the Cavendish in 1937, following the death of Rutherford, he was an established researcher who was well regarded by his peers[xii].

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[v] see Appendix 2
[vi] see Appendix 2
[vii] see Appendix 2
[viii] see Appendix 2
[ix] see Appendix 2
[x] see Appendix 2
[xi] ${}_1^2H+{}_1^2H\rightarrow{}_1^3H+{}_1^1H$
[xii] Details of Oliphant's life and work in the Cavendish can be found in Cockburn, S and Ellyard, D 'Oliphant; The Life and times of Sir Mark Oliphant' Axiom Books 1991.

1.3 The Young Professor, a Great Physicist and Part of the Cavendish Network

When Oliphant entered the Cavendish, he had not realised that he would ultimately become a member of a network of eminent physicists and that this network would remain in existence for most of their lives. This network was formed through the friendships and the mutual respect that developed amongst the individuals who worked in close association with each other and under the leadership of the legendary Rutherford. Members of this network would later form the backbone of the British scientific war effort which resulted in the development of both radar and nuclear weapons.

In October 1937, Oliphant took up his position as Professor of Physics at Birmingham University. As an experienced researcher, Oliphant wanted to follow the research directions started at the Cavendish. He was determined to have his own accelerator, so he could continue his researches into nuclear physics. He decided he needed an accelerator that would provide him with particles carrying the most energy available. There was a new type of accelerator which had been developed by Ernest Lawrence (1901-1958) at Berkeley in California in the early 1930s: the cyclotron[xiii] [6]. The cyclotron could deliver much more energy to the accelerated protons than either the Cockroft-Walton design or the Van der Graaff design, of linear accelerators. In fact, Oliphant wanted a bigger version of Lawrence's machine[7]. This interest in the cyclotron would bring Oliphant into contact with Lawrence with whom he would form a working relationship in the years to come. Of his Cavendish colleagues, Chadwick was now Professor at Liverpool while Cockcroft was still at the Cavendish.

[xiii] see Appendix 2

Oliphant was now about to show himself as a leader who could attract bright students and develop their research interests. His first research student was Ernest Titterton (1916-1990) who later, at the outbreak of war, would be called back by Oliphant to take part in the Admiralty's radar work[xiv] [8]. Titterton would later become one of the individuals involved with work on atomic weapons in both Britain and the US. Titterton would afterwards travel to Australia to take up the Chair of Nuclear Physics at the Australian National University. He was also involved in the British atomic tests in Australia[xv] [9].

In December 1938 the phenomenon of fission had been observed by Fritz Strassman (1902-80) and Otto Hahn (1879-1968) when uranium was bombarded by neutrons producing two other elements with masses about half that of uranium, specifically barium and lanthanum. The theoretical interpretations of this process had been proposed in January 1939 by Lise Meitner (1878–1968) and her nephew Otto Frisch (1904–79), '*gradually the idea took shape that this was no chipping or cracking of the nucleus but rather a process to be explained by Bohr's idea that the nucleus was like a liquid drop; such a drop might elongate and divide itself*'[10].

By the end of 1939 it had been determined that this fission process could release both energy and neutrons. In August 1939 Neils Bohr (1885-1962) and John Wheeler (1911-) had determined that, of the two main isotopes[xvi] of uranium, the rare uranium-235 was fissile by slow neutrons while the more common uranium-238 was not. Natural uranium is composed of 99.3% uranium-238 and 0.7% uranium-235. In 1941, it would be discovered that another element would also be readily fissionable. This new element,

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[xiv] Details of this work and the history of Oliphant's involvement with it may be found in Cockburn and Ellyard

[xv] see chapter 3

[xvi] see Appendix 2

plutonium, could only be produced when a uranium-238 nucleus captured a neutron[xvii] and then underwent two successive beta decays[xviii] producing plutonium239. Physicists soon realised that the process of fission had the potential to produce explosions and that the then scarce uranium would be required in greater quantities. Marcus Oliphant was one of a number of physicists who became involved in this type of nuclear research when in September 1939 war was declared[11].

Uranium work was still public in the sense that papers were being published in academic journals and anyone could get access to them. Work on fission had now slowed since most of Europe was at war and pressing defence needs were of greater importance than some interesting work in nuclear physics. In Britain, most physicists were now being employed in the development of a new defensive measure called radar. Work on radar was highly classified since it was anticipated that radar sets would be located around the coastline of Britain forewarning of any future attacks. Further, radar developments included placing these sets on aeroplanes and ships.

Oliphant and many of his team at Birmingham were now working for the Admiralty on radar. This work was a highly secret operation and those involved were all required to take oaths of secrecy. However, those scientists resident in Britain who were foreign nationals (ie not British Subjects) or those regarded as being enemy aliens, were left to do their own research, relatively unaffected by the other work around them. Many of the so called enemy aliens were of course the refugee scientists who had escaped from those parts of Europe then under German domination. Two of these refugee

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[xvii] ${}^{238}_{92}U + {}^{1}_{0}n \rightarrow {}^{239}_{92}U + \gamma$, ${}^{239}_{92}U \rightarrow {}^{239}_{93}Np + e$, ${}^{239}_{93}Np \rightarrow {}^{239}_{94}Pu + e$

[xviii] see Appendix 2

scientists who had made their way to Oliphant's department at Birmingham University were Otto Frisch and Rudolph Peierls (b1907).

Peierls had arrived in Britain some years before the war to work at the Cavendish where he had met Oliphant. Oliphant had encouraged Peierls, who had now become a naturalised British citizen, to apply for the newly created Chair of Applied Mathematics at Birmingham. Otto Frisch had been invited by Oliphant to spend the summer of 1939 in Birmingham. With the declaration of war in September of that year Frisch was effectively stranded in Britain. Frisch, a German Jew, had already left his homeland but now could not even return to Copenhagen where he had been working with Neils Bohr. Frisch took up residence with Peierls[12]. This pairing would lead to the production of a document; the Frisch- Peierls Memorandum which would ultimately lead Britain towards the development of an atomic bomb.

At the time Frisch had arrived in Britain, Peierls had been working on the problems of self-sustaining nuclear reactions, building on the work of Francis Perrin who had predicted in May 1939 that there would exist a minimum or critical mass of fissile material that was required before such a self-sustaining reaction could take place. Perrin was a member of a group of French scientists working with the Joliot-Curies on fission experiments in Paris. This group had, in 1939, discovered that when natural uranium was used as the fissile material, the resulting neutrons could be slowed down by water. They were, however, struggling to achieve a self-sustaining reaction using water as a moderator[xix] when they discovered that heavy water[xx] could slow down the neutrons without absorbing too many of them. They had in fact determined how to control fission reactions by introducing neutron absorbing materials[13].

[xix] see Appendix 2

[xx] Heavy water is naturally occurring but the hydrogen atoms in are in the form of the hydrogen isotope, deuterium, which was discovered in 1932.

While Oliphant was involved in his secret Admiralty work, he had been brought into contact with such powerful men as Sir Henry Tizard, Scientific Adviser to the Air Ministry. It was Tizard's committee that had advised the British military to develop a method of detecting aircraft off the coast of Britain (radar)[14]. Oliphant now had his first entree to relatively senior members of government. Oliphant would quickly learn how to exploit this access to senior government officials and over the next twenty or so years made his views known to the Prime Ministers of both Britain and Australia. It was also during this period that it became apparent that Oliphant did not take security issues too seriously. In fact it appeared that secrecy on matters of national security did not even enter Oliphant's consciousness. An early incident, related in Cockburn and Ellyard[15], describes how Lord Rothschild who was in charge of war time security was able to secretly take a magnetron[xxi] from a work bench in Oliphant's laboratory and leave with it in his pocket, without anyone detecting that the magnetron had gone missing.

In early March 1940, Oliphant received a short note from Frisch and Peierls, entitled 'On the Construction of a "Super-bomb" based on a Nuclear Chain Reaction in Uranium'. The notion of using the fission reaction to power a bomb had already been discussed in scientific circles but it was thought that such a device would require several tons of the rare uranium metal. The Frisch-Peierls note described that a fission explosion could be achieved using only a few kilograms of pure metallic uranium made up from the rare uranium-235 isotope of uranium. The note continued to discuss the possible method of obtaining this isotope in sufficient quantities (thermal diffusion of uranium hexafluoride gas), the construction of such a bomb and the possible radiation effects of the fission products after the explosion of such a bomb[16]. The note

[xxi] See Appendix 2

is significant in that it was short, it was written in a non-technical style so that a non-physicist could readily understand most of its content but it contained enough technical information to allow physicists to make their own calculations in verification.

Oliphant received the memorandum in early March 1940, by the 19th March it had arrived on Tizard's desk with a covering note from Oliphant. The covering note suggested that a Committee be established comprising G.P.Thomson (1892-1975), Blackett, Oliphant and Tizard[17]. Tizard in turn sent a copy to Thomson who wanted to discuss the contents with Oliphant and Cockcroft[18]. On the 10th April, Thomson, Oliphant, Cockcroft and another ex-Cavendish physicist, Philip Moon (1907-1994), met under instructions from Tizard, at the Royal Society headquarters with the purpose of determining if such a 'super-bomb' could be constructed[19]. A fifth man was also present at this meeting, the French businessman and secret agent, Lt Jacques Allier, who informed the meeting that the French had secured the entire stock of heavy water from Norway[xxii]. Allier, who worked for the Deuxieme Bureau, was sent in February 1940 to Norway to purchase the Norsk Hydro heavy water and bring the entire stock to Paris. Allier had booked on a flight to Paris from Norway which was intercepted by the Germans, but he did manage to catch another flight to Scotland[20]. Allier also stated that the Germans were anxious to acquire some of this stock of heavy water[21]. It was now apparent that the Germans were also involved with work on the fission process.

1.4 The MAUD Committee

By June this small committee of essentially ex-Cavendish physicists had grown to include the Nobel Laureate N.Haworth and two more ex-Cavendish

[xxii] At this time the only plant producing heavy water was the Norwegian Hydro-Electric Company. In 1940 the entire stock of heavy water at the plant was some 180 litres.

men, P.Blackett and C.Ellis. This Committee had become known as the MAUD Committee. Both Frisch and Peierls were excluded from the Committee but were included in the Technical Sub-committee[22]. Oliphant would himself be excluded from the MAUD Committee in 1941 when it would undergo a reorganisation. Oliphant was then relegated to the Technical Sub-committee[23]. However, Oliphant, unlike other members of this Sub-committee, would not be working directly on research into the bomb.

The MAUD Committee was responsible for bringing together a number of individuals who would later form the backbone of the Australian Atomic Energy Commission to work on uranium and fission. One such person was Philip Baxter (1905-1989). Baxter had graduated in chemistry from Birmingham University in 1927 and completed a PhD in mechanical engineering in 1928, thus qualifying as a chemical engineer. Baxter accepted a research position at ICI Ltd. In 1931 Baxter was transferred to the company's Central Laboratories at Widnes where his work entailed the development of new products especially those containing chlorine or fluorine[24]. Baxter would later travel to Australia to become Professor of Chemical Engineering and later Vice-Chancellor of the University of New South Wales and Chairman of the Australian Atomic Energy Commission.

James Chadwick, from Liverpool University was responsible for coordinating the research into the properties of uranium[25]. Chadwick happened to meet by chance, on a train journey from Liverpool to London in 1940, the young Philip Baxter. Chadwick asked Baxter if uranium hexafluoride could be produced and, if so, could Baxter supply him with some. Baxter sent 25g of uranium hexafluoride to Chadwick. This initial work of Baxter's was done on a purely personal basis for Chadwick[26]. But then Chadwick requested more uranium hexafluoride. Baxter was unwilling to use his company's resources without

knowing to what purpose the uranium hexafluoride was being put. Consequently Baxter and ICI became involved in the Tube Alloys Project[xxiii] when it became established. Eventually Baxter was also asked to produce pure metallic uranium[27].

Ernest Titterton, who had been a school teacher, was also brought into the uranium work initially to assist Frisch in determining the critical mass of uranium. Frisch and Titterton would later be transferred from Birmingham to Liverpool to continue with this work[28].

The MAUD Committee produced its report on 30 June 1941, recommending that a bomb was feasible and that atomic energy could also be a useful source of electrical power[29]. A minority report, produced by Blackett suggested that the full-scale plant to produce the bomb be set up outside Britain, possibly in the US or Canada. This minority report was taken up by the Ministry of Aircraft Production[30]. The MAUD Committee ceased to exist in December 1941 but its work had been taken over by the Tube Alloys Project which had been established in October that year.

Oliphant was not part of the Tube Alloys Project in any capacity. He now protested loudly and vigorously about not being included. He was aware of the central role he had played in bringing the Frisch-Peierls Memorandum to the notice of government and effectively starting the MAUD Committee[31]. Part of Oliphant's protest would be echoed by him over the years as 'the whole thing is in the hands of non-nuclear physicists and is therefore being badly mismanaged'[32]. This statement was not true since nuclear physicists such as Sir Edward Appleton (1892-1965) was on the Tube Alloys Consultative

[xxiii] The Tube Alloys Project was the British atomic bomb project which was established shortly after the MAUD Committee produced its recommendations. The Tube Alloys Project was eventually moved to Canada and later subsumed into the Manhattan Project.

Council and James Chadwick and Rudolph Peierls were members of the Technical Committee[33].

A copy of the MAUD Committee report had been sent to the US. At this time the focus of the American uranium program was to produce a power source for submarines that would not be dependent on oxygen and hence would allow them to be submerged for greater periods of time[34]. In July 1941 the US was not interested in producing a 'super bomb'. However in December 1941, the direction of the US uranium work would rapidly change.

1.5 Travels to the US

While those around him were involved in the uranium and fission work, Oliphant continued with his work on magnetrons. A collaboration had been established between Britain and the US in the development of more sophisticated magnetrons. In August 1941, Oliphant went to the US essentially to continue work on this partnership. However, before he left Britain he was approached by Thomson who asked him to investigate why the US had not responded to the contents of the MAUD Committee Report[35]. When Oliphant was finally able to free himself from radar work to follow the mission entrusted to him by Thomson, Oliphant was shocked to discover that the MAUD Committee's report had languished unread in the safe of Lyman Briggs, the head of the National Bureau of Standards in Washington[36].

Oliphant now attempted to enthuse Briggs, but failed. He then attempted to interest Vannevar Bush (1890-1974) and James Conant (1893-1978) in the findings of the MAUD Committee, with a similar result to that experienced with Briggs. Oliphant was not easily deterred. He now went to Berkeley to visit Ernest Lawrence with whom he had been corresponding for a number of

years. The nett result of this visit was the production by Oliphant of a summary of the MAUD Committee report[37] and the inspiration to produce enriched uranium through electromagnetic separation using Lawrence's cyclotron as a mass spectrometer[38]. Lawrence took Oliphant's summary and met with Conant and Arthur Compton (1892-1962). This meeting ultimately led to a restructuring of the US Uranium Committee and ultimately to the establishment of the Manhattan Project[39].

1.6 Forever an Australian

Whilst in Washington, in August 1941, Marcus Oliphant had another meeting, this time at a dinner party with Richard Casey (1890-1976), later Lord Casey. Casey had resigned from the Federal Ministry in 1940 to take up the post of Australian Minister to the US and was responsible for establishing Australia's first diplomatic mission there[40]. It was in this capacity that Oliphant was introduced to him. Oliphant initially discussed radar work with Casey but later mentioned a new scientific project that was currently being undertaken by both Britain and the US[41]. It was obvious from Casey's replies that he knew nothing of MAUD or the uranium project, so Casey asked for a note on the project.

The next morning, 26th August, Oliphant sent Casey a four page letter, effectively summarising the findings of the MAUD Committee which at this time was secret. Oliphant, in his covering note, suggested that Australia should '*do some work on the energy machine, so that if and when she wishes to exploit it she will have something with which to bargain*'[42]. The other significant aspect of this note was the stress for the peaceful uses of the 'Uranium Energy Machine', but he did mention the requirements for a bomb

and the possible radioactive after effects of such an explosion[43]. Oliphant even suggested that this form of energy could use Australian uranium:

> *'It is possible to make a machine in which the production of energy is less violent than in the bomb and which could be used for the commercial production of power. Such a machine could be realized at the present time ... by mixing uranium oxide with "heavy water", or deuterium oxide, or possibly also with carbon or beryllium ... Such a machine should be capable of producing 100,000 horsepower for very many years without any fuel whatsoever. It would be of the greatest possible importance to Australia, with her isolated coal-fields. I am confident that the scientific and engineering problems will be overcome and that Australian uranium, will prove as valuable to the country as oil-wells have to America'*[44].

What is remarkable about this note is that very little was done with the information it contained. The note itself has languished in a file, now in the National Archives of Australia in Canberra. Casey followed this note up by sending a copy of it to David Rivett (1885-1961) who was then the Executive Officer of the CSIR[45]. Australia was also at war with Germany at this time. Rivett and the rest of CSIR[xxiv] were too much involved with the Australian radar project to be concerned with some new research project that at the time was still of a theoretical nature and under a military classification. According to Tim Sherratt, Rivett did not just ignore the note, he '*began to seek more information through his scientific contacts, and tried to arrange for increased Australian involvement in the work. He was, however, unsuccessful*'[46].

Casey did not pursue the issue further, as an engineer he had the technical background to understand what Oliphant was communicating but the notion of

[xxiv] CSIR stands for Council for Scientific and Industrial Research

a machine that could produce huge amounts of energy without refuelling seemed a little extreme and in the realm of fantasy. Political turmoil hit Australia when the general election brought not only a change in Prime Minister but a change in the governing party (see Chapter 2).

Oliphant's final comment *'that if and when she wishes to exploit it she will have something with which to bargain'* is quite significant in the sense that he virtually pre-empts what was later to occur in the research area of the Australian Atomic Energy Commission (see chapter 3). These words were written before the bombing of Pearl Harbour, hence before the British, Americans and Canadians had contracted the Quebec Agreement (discussed later in this chapter). It seems that Oliphant was a man of vision or, at least, a man who was shrewd enough to see not only what the ultimate potential of atomic energy could possibly be but also that there could be some potential that such knowledge could be used as a commodity in dealing with other nations.

In December 1941 Japan attacked the US Naval Base at Pearl Harbour in Hawaii, bringing the US into the Second World War. Within months the Japanese military moved south to occupy most of South-East Asia. Once Singapore fell to the Japanese in February 1942, Oliphant saw Australia as being under threat, and immediately offered his talents to the service of his country, especially in the area of radar research. What he had hoped to achieve is unknown but he was now reunited with his family whom he had sent to the safety of Australia two years before. However, Oliphant was not really welcomed in Australia and returned to Britain with his family in October 1942[47]. During his time in Australia Oliphant had attempted to encourage the CSIR to ensure that control of uranium ore deposits was vested in the Commonwealth government[48]. Oliphant himself claims that he did not suggest

that the government should control the uranium deposits, but that *'if there was uranium in the country that it would be wise not to let it go overseas unless they decided that they didn't want to use it themselves'*[49].

Regardless of whether Oliphant used the term 'control' or not, he still attempted to alert the scientific community of the need for uranium and indirectly of the potential uses of atomic energy. While it was known that Australia had deposits of uranium, the extent of these deposits would not be known for a number of years and uranium was still regarded as a rare ore. In 1942 uranium was known to exist at Mt Painter in the North Flinders Ranges where it had been discovered in 1910[50] by Sir Douglas Mawson[51]. Australian uranium had first been discovered in Carcoar New South Wales in 1898 and was first mined at Radium Hill, in the Olary area of South Australia. While on the surface it appeared that Oliphant was again unsuccessful, Australia did gain control of its uranium deposits (see chapter 2).

1.7 The Manhattan Project

When Oliphant returned to Birmingham in early 1943, his work on radar was virtually complete. The work on Tube Alloys was continuing but Oliphant was now no longer a member of the inner circle of this project. Yet he did manage to glean that progress was very slow. The processes devised for the enrichment of uranium were not producing a large enough yield quickly enough. So now Oliphant suggested an alternate proposal, that of electromagnetic separation using a cyclotron[52]. He sent his proposal to Edward Appleton who was secretary of the Department of Scientific and Industrial Research under which Tube Alloys operated. Appleton sent his note onto the leaders of the Tube Alloys project with the subsequent request that Oliphant join the project[53].

Britain at this time did not have the funds or the capacity to house such a large research undertaking, so it had earlier been decided to move some of the Tube Alloys work to the safety of Canada. Scientists in the US were working on their own uranium project which changed direction after the bombing of Pearl Harbour. The Americans now decided to produce the uranium bomb. Negotiations between the three countries resulted in the Quebec Agreement which was signed on 19th August 1943[54]. With the agreement signed, all the Tube Alloys personnel were transferred to continue work in Canada or seconded to the US project, now called the Manhattan Project. Oliphant was one of many who now found themselves working with their talented peers in a number of locations in the US[xxv].

Oliphant continued his work with Ernest Lawrence in Berkeley investigating the use of electromagnetic separation of uranium isotopes, while Philip Baxter was located at the Oak Ridge Laboratories in Tennessee[55] working on the production of uranium hexafluoride and Ernest Titterton was sent to Los Alamos in New Mexico to continue his work on the fission reactions[56]. As is now well known the collaboration between the three nations did produce an atomic bomb. In fact it produced three, one was made from enriched uranium and two were made from plutonium. The first bomb exploded was a plutonium bomb. As a result the Second World War ended on 15th August 1945. With the end of the war both in Europe and in the Pacific, many of the scientists working in Canada and the US wanted to return to their homes and families. The US attempted to keep the best with offers of employment, but most simply wanted to return, so Oliphant, Baxter and Titterton returned to Britain

[xxv] details of both these projects can be found in Gowing, M 'Britain and Atomic Energy; 1939-1945' Macmillan and Co Ltd London 1964 and [xxv] Hewlett, R and Anderson, O 'The New World,1939-1946, Volume 1, A History of the USAEC' Pennsylvania University Press Pennsylvania 1962.

and the new challenge of bringing the promise of atomic energy into a peaceful reality.

Oliphant had in fact left the Manhattan Project a few months before any of the bombs were detonated. By October 1945, Oliphant was back in Birmingham but the reality of the atomic bomb and its destructive effects made him even more determined to harness this form of energy for peaceful purposes. Oliphant himself now became the public advocate for the peaceful uses of atomic energy. In his own style, Oliphant was knowledgeable, could communicate in broad terms the physics involved in atomic energy and was very outspoken to the media who seemed to enjoy quoting him.

1.8 The Peacemaker Returns Home to Australia

Shortly after Oliphant returned home to Britain, he became involved in another new project, that of setting up a British atomic energy research establishment. By April 1945, Cockroft and Oliphant toured a number of sites which were being considered as possible locations for this new establishment. They suggested two of the sites in the Oxford-Cambridge area[57]. The site most favoured and hence recommended was a disused airfield at Harwell near Oxford. By July, the British atomic energy research establishment had a director, Sir Edward Appleton, and the support of the newly elected Labour Prime Minister, Clement Attlee. The reactor for this site had already been designed by the Graphite Group which had formed in 1944 in Montreal[58]. It is of interest to note that neither Attlee nor Truman, who took office on Roosevelt's death, knew anything about the atomic bomb project before their respective elevations to power[59].

The Commonwealth Prime Ministers' Conference of 1946 was held in Britain in May. According to Cockburn and Ellyard, Ben Chifley (1885-1951),

Australia's Prime Minister, had a number of items on his agenda apart from the Conference. One was to find an Australian expert in atomic energy to act as the scientific adviser to a United Nations conference[xxvi] and another was to find advisers to assist him with the establishment of his national research university in Canberra. For the first, Chifley brought the Minister for External Affairs, Dr Herbert Evatt (1894-1965) and for the second he brought the Director of Post-War Reconstruction, Dr H.C.Coombs (1906-1997). So during a break in the Prime Ministers' Conference, Coombs approached Harrie Massey (1908-1983) who was then at University College London. Massey had been educated at Melbourne University and later at the Cavendish Laboratory. He was not enthusiastic about a research establishment in Canberra or leaving Britain but he suggested that Oliphant might be interested[60]. Consequently Oliphant was invited to London by the Australian Prime Minister to attend a meeting with him, Evatt and Coombs. Oliphant agreed to act as the scientific adviser to the Australian delegation and later that year travelled to New York as part of this Australian delegation with Dr Evatt[61].

The reporting of these events by Cockburn and Ellyard appears now to be somewhat flawed. Records from the National Archives of Australia indicate that Oliphant had agreed in March to be part of Australia's delegation to the United Nations Atomic Energy Commission[62]. Did Chifley make more than one trip to London in 1946? This is unlikely since travel from Australia to Britain was not the simple one-stop flight it is today. Obviously Oliphant must have been approached some time prior to Chifley's arrival for the May meeting. If this is the case, by whom and why was there a totally different version of events reported in the Oliphant biography?

[xxvi] this will be discussed in detail in the next chapter

Having met Oliphant, Coombs and Chifley were now determined that they wanted this enthusiastic scientist back in Australia. On the other hand Oliphant was not so convinced, as he was reasonably happy at Birmingham and was in the process of building the synchrotron which he had designed. Nevertheless, Oliphant now had the ear of the Australian Prime Minister and over the next decade would continue to have this type of familiarity with Chifley's successor, Robert Menzies (1894-1978). Oliphant was now often quoted in the Australian media, as after all he was a most eminent and vocal Australian scientist. During the period 1946 to 1950, there would be much negotiation between Oliphant and the Australian officials who were attempting to bring him out. Oliphant made many and great demands on Australia, they were all eventually met.

During this period, Oliphant would be quoted regularly in the Australian media. Oliphant obligingly would state what he thought the politicians wanted to hear, be it as a dove or be it as a hawk[63]. It was also during this period that Chifley and later Menzies would bring Australia into the Atomic Club but not in the manner that they had first envisaged (see chapters 2 and 3). From 1946 until his arrival in 1950 Oliphant would also make a number of very significant contributions to Australian science policy. Many of these will be dealt with in context in later chapters. As had happened earlier in his life, Oliphant's ideas would often be taken up by government but he was rarely if ever allowed to follow them through. His reputation as an outspoken individual would continue to deny him access to sensitive government material and policy formation.

In August 1950 Oliphant finally arrived in Australia[64]. He took up the position of Director of the Research School of Physical Sciences at the Australian National University. Almost immediately he started to make plans to build a synchrotron in Canberra. Once established, he managed to encourage others

from Birmingham to follow. Oliphant was now possibly in his prime. He was head of his own research establishment, he had money available to him for equipment and personnel, he was feted by government and media and had the adulation of a nation. But this would not last, his loyalty to Australia would be questioned and his abilities as a physicist would also be questioned.

It has already been noted that Oliphant had a somewhat relaxed approach to security. His reputation was further damaged by two different 'spy scandals'. The first was the revelation, in March 1946, that Alan Nunn May had acted as a spy for the Soviet Union. Nunn May had been an undergraduate in Oliphant's Physics Department in Birmingham. What added to the scandal was that Oliphant knew Nunn May's family who lived near the Oliphants in Birmingham[65]. The second scandal was the famous Klaus Fuchs affair. Fuchs was arrested in Harwell in early 1950, as a Soviet agent. But Fuchs had worked at Birmingham with Rudolph Peierls and Otto Frisch and, later, on the Manhattan Project[66]. Both spies were Birmingham men and Oliphant was their Professor so now Oliphant was tarnished by guilt through association.

Oliphant would continue with his researches and would later become Governor of his home state, South Australia. By the time of his death in July 2000 Oliphant would have regained much of his earlier reputation purely from his great integrity. He was seen as a prominent opponent of the nuclear arms race.

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[25] p48 Gowing
[26] p52 Gowing
[27] National Library of Australia Oral History, interviewer D.Ellyard, interview with Sir Philip Baxter 6th May 1980, P1:1/2 TRC 777/7
[28] p101 Cockburn and Ellyard
[29] p394-436 Gowing
[30] p92 Gowing
[31] p110 Gowing
[32] p111 Gowing
[33] p109 Gowing
[34] p15 Hewlett and Anderson 'The New World,1939-1946, Volume 1, A History of the USAEC' Pennsylvania University Press, Pennsylvania 1962
[35] p103 Cockburn and Ellyard
[36] p104 Cockburn and Ellyard
[37] p43 Hewlett and Anderson
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[39] Ibid
[40] p4 and p12 White, F. 'Richard Gardiner Casey 1890-1976' http://www.science.org.au/academy/memoirs/casey.htm
[41] p112 Cockburn and Ellyard
[42] National Archives of Australia A3300/7 218 'Atomic Energy- Prof Oliphant's Memo'
[43] A3300/7 218
[44] ibid
[45] p112 Cockburn and Ellyard
[46] Sherratt, T 'On the beach: Australia's nuclear history' http://www.asap.unimelb.edu.au/pubs/tps/tps_on_the_beach.htm
[47] p90-93 Cockburn and Ellyard
[48] p365 Moyal
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[50] p2 Cawte
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[52] p110 Cockburn and Ellyard
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[58] p281 Gowing
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[60] p145 Cockburn and Ellyard
[61] p131 Cockburn and Ellyard

[62] National Archives of Australia A1838/283 720/1 Part1 'Atomic Energy Commission'
[63] National Archives of Australia press cutting in A5954/69 item 2164/1
[64] p171 Cockburn and Ellyard
[65] p133 Cockburn and Ellyard
[66] Ibid

2 MEN OF VISION AND A WORLD POWER IN EMBRYO

2.1 Introduction

In the period between the two World Wars Australia was essentially a white Anglo-Saxon nation, British by culture, with an export economy based on primary production and mining. It was a sparsely populated continent with a coastline so long that it could barely be patrolled let alone defended. Its industry was still in its infancy and its manufacturing base little more than a primary refinery for its metallic ores. The populace saw Britain as its home and regularly sent its most promising and wealthiest sons to be educated there. There were a number of flourishing universities, essentially one in each state, and while these universities compared well academically to those in Britain, most Australians saw themselves as an outpost of British life and culture in the Asia-Pacific region.

In 1939, when Britain declared war on Germany, Australia also declared war. Young men followed the call to enlist, just as their fathers and uncles before them, and sailed off to fight for Britain. When the British garrison in Singapore was captured by the Japanese army in February 1942, most of Australia's trained and armed men were in North Africa or were attached to the Royal Air Force and Royal Navy in Europe. Essentially Australia was undefended. Had the US not entered the war after the bombing of Pearl Harbour, Australia could well have been left alone and unprotected against an alien force.

Robert Menzies was Prime Minister of Australia in September 1939 when Australia pledged support to Britain. Menzies had resigned from the Lyons Cabinet in March of that year after both personal and political differences with his cabinet colleagues[1]. Menzies was returned to office as Prime Minister following the death of Joseph Lyons (1879-1939) at Easter and the short

period during which Earle Page (1880-1961) acted as caretaker Prime Minister[2]. As Prime Minister, Menzies had recruited a young economist, H.C. (Nugget) Coombs, from the Commonwealth Bank and appointed him to the Treasury[3]. This single appointment would bring to prominence an individual whose vision and intelligence would serve the nation as few have before or since. Coombs had the ability to sense the direction in which the nation should move and the courage to carry this out. He would serve the Australian people in areas ranging from science to the arts until his death in 1997.

The General Election of 1940 had resulted in the Government and Labor Opposition both winning 36 seats, the remaining two seats were held by Independents who sided with the Government[4]. The situation in Canberra was far from stable and with a war in progress in Europe a crisis was in the making. Early in 1941 Menzies established a Reconstruction Division in the Department of Labour and National Service[5]. This small Division had the task of planning for the post-war period when all the troops would return to Australia. The widespread unemployment and subsequent depression of the immediate period after the First World War was a situation that Menzies had hoped to prevent. However, under Menzies this Division had made very little progress in post-war planning. This situation would change in the coming months.

By August 1941, Menzies was again in trouble with his own cabinet colleagues and it was suggested to him that he should resign, which he did in that month[6]. The Leader of the Country Party, A.W.Fadden (1894-1973), replaced Menzies. In the following September he attempted to present his budget and when it was finally placed before the House for a division, the two Independents, Wilson and Coles, crossed the floor and voted with the Opposition. The Budget was rejected and Fadden's Cabinet was forced to

resign. John Curtin (1885-1945), the Leader of the Opposition, was commissioned to form a government[7]. Curtin's Deputy was Francis Forde and his Treasurer was to be Ben Chifley.

On 7th December, Japan made a simultaneous assault on the US bases in Pearl Harbour and the British bases in Malaya. By February 1942, Singapore was in Japanese hands and, days later, Darwin was bombed. During the following month Darwin, Wyndham and Broome were bombed repeatedly[8]. Australia was now at war on two fronts but the most pressing was the one immediately to the north. Most trained Australian troops were still in the Middle East and Europe, so Curtin attempted to bring two thirds of them home. Churchill, however, attempted to divert these Australian troops, to help the British with their dire Burma campaign. The troops did return home but now Curtin was aware that Britain put Australia's needs as secondary to her own and, what was worse, was prepared to sacrifice Australia until the war with Germany was won[9].

Australia was now able to adequately defend itself, but depended upon US assistance. This was only after Japanese submarines had successfully entered Sydney Harbour, thus showing how vulnerable Australia's largest city was. These incidents affected the politicians in Canberra in such a way that there was now a determination that Australia must become an independent nation capable of defending itself and not dependent on the behest and largesse of other English-speaking nations.

2.2 Chifley and a Vision of Australia Splendid

In October 1942, Curtin made his first public move towards what he saw as his post war objectives by introducing a bill in Parliament on Post-War

Reconstruction[10]. The small reconstruction division in the Department of Labour and National Service that Menzies had established in 1941 was now transformed into a new department and renamed the Department of Post-War Reconstruction[11] and by December 1942 it was established as a separate Ministry, with H.C. Coombs as its Permanent Head and Chifley as its Minister[12]. If this Ministry was to be effective, it was necessary for the Commonwealth to subsume some state powers. To this end a Federal-State Conference had agreed to delegate some state powers to the Commonwealth for a period of up to five years after the conclusion of the war[13].

Manning Clark states that '*Curtin had a great dream. He had dreamt that here in the South Pacific Australians would rear a nation that would be an example to others*'[14]. This statement could well describe what now started to develop from the Department of Post-War Reconstruction. Chifley was also a visionary who saw Australia as an industrial as well as agricultural exporting nation whose customers were to come from its immediate vicinity. Thus Chifley saw full employment and development of Australia and its neighbours as being essential[15].

Chifley, during the War years, pushed through a variety of social security benefits to assist Australians both during the hardships of the War years and to continue after the War. These benefits included widows' pensions, unemployment, sickness, pharmaceutical, hospital, maternity and funeral benefits[16]. Chifley was determined to ensure that Australians would never again suffer as they had in the aftermath of the First World War and during the harsh Depression years.

The Department of Post-War Reconstruction set about to establish in Australia a defence capability which, in the event of another war, could be

utilised to protect and defend the nation. High on the national agenda was increasing the white population through suitable immigration and the decentralisation of the growing metropolitan population centres into rural areas. This required the opening up and greening of what was effectively drought-prone country and turning it into productive agricultural land. New rural towns could not be established or existing ones encouraged to grow further without some form of employment for the non-farming members of these communities. This development and growth would occur through industrialisation and the establishment of manufacturing industries. The need to industrialise was an imperative.

At the commencement of the Second World War Australia could not even produce its own tanks, combat aircraft and assault vessels. A manufacturing and industrial base with a skilled and trained work force was needed. These industries could then be converted to war or defence manufacturing when the need arose. This new manufacturing community would require electrical power to sustain it and, in a nation which was thought to have limited fossil fuel supplies[xxvii], hydroelectricity and atomic energy could provide these needs. Only an educated nation could support this type of expansion. With this in mind, new universities were to be established in the states with the jewel in the crown being a National Research University, located in Canberra, and modelled on the Institute of Advanced Studies at Princeton.

It was through this Department of Post-War Reconstruction that the Snowy Mountains Scheme and the Australian National University would be established. Unfortunately Curtin would not live to see this, as he died in July 1945, but the new Prime Minister, Ben Chifley, continued the vision. The

[xxvii] These supplies were essentially coal since at this time there was virtually no oil or natural gas supplies known to exist in Australia.

position of Minister for Post-War Reconstruction went to John Dedman (1896-1973), who was also the Minister-in-charge of CSIR which had been established by Prime Minister Stanley Bruce (1883-1967) on 23rd March 1926. After the elections held on 28th September 1946, Dedman retained both these positions and was given the additional responsibility of Minister for Defence. Since Dedman held both portfolios one could be excused for assuming that the projects undertaken by the Ministry of Post-War Reconstruction were part of a Defence agenda.

2.3 The Snowy Mountains Scheme

Industrialisation produced a need for power and especially the need for a national power grid that could be protected from outside interference. To further the development and safety of a European society in Australia, widespread immigration was seen as the key to populating the vast inland regions of the continent. The inland was desert, consequently new ways of making the desert bloom were being devised. Rivers could be re-routed through underground tunnels, dams could be built to ensure a regular water supply for irrigation. The Department of Post-War Reconstruction was to oversee all this. Coombs, Chifley and Curtin had been impressed with the developments of the Tennessee Valley Authority project which Roosevelt had established as part of his economic 'New Deal' that helped to rejuvenate an area that had been severely depressed. Taking this as their model, the Australians were making plans for a similar project.

This project became the Snowy Mountains Scheme which would re-route the course of the small eastward flowing Snowy River. The Snowy River would now flow through the mountains and enter the western flowing Murrumbidgee and Murray Rivers providing much needed water to inland Victoria and NSW.

In the process, a number of lakes were to be created behind the walls of a number of dams by means of which hydro-electric power stations could provide power to the grids of two states as well as servicing the needs of the ACT. The diversion of the river and the construction of the dams and hydro-electric power schemes by the Commonwealth led to some concerns by the States involved, as they would invariably lose some of their power to the Commonwealth.

The problem of selling the Commonwealth scheme to the States remained. The breakthrough came when one of the senior public servants '*studied the Act under which the Tennessee Authority had been set up and the lawsuits by which it was challenged. He found that one of the grounds on which it was held to be constitutional was that it was vital for defence*'[17]. So now the politicians had their ploy. The Governor General, Sir William McKell, who had been appointed to this position in 1947, advised Chifley '*to go ahead with the scheme under the defence power, leaving it to any who opposed the move to put themselves in the position of seeking to obstruct a great national undertaking*'[18]. This reference from 1947 sees the Snowy Mountains Scheme as part of national defence. The States had been effectively silenced and forced to give over their powers to the Commonwealth. In return, NSW would get its extra water for the Murrumbidgee Irrigation Area, and Victoria would get some extra power and water for the Murray. Everyone was happy and the greatest engineering and social feat in Australian history was achieved.

This social feat involved bringing together thousands of migrant workers to the area and giving them employment for the period of the project. These migrants included professionals and skilled and unskilled workers who came from all over Europe with their individual languages and customs. They included individuals who had fought on opposite sides during the war and

individuals from traditionally antagonistic groups. All these groups learnt to live and work along side each other learning a common language and sharing common experiences.

2.4 Atomic Energy (Control of Materials) Act 1946

In early 1944 the British Government, fearing that its access to uranium ore was now limited by the contract of the Quebec Agreement, approached the Dominion nations, including Australia, with a request to search for uranium deposits[19]. On 17th May 1944, John Curtin cabled Forde in Australia advising him that Britain urgently needed supplies of uranium for '*empire and war purposes*'[20]. At this time only two locations were known to have deposits of uranium, Mt Painter which is located in the Flinders Ranges of South Australia and Radium Hill, also in South Australia. Both locations were regarded as being inaccessible, and in particular access to Mt Painter was by rail and camel. By the end of May 1944, '*roads were under construction*'[21] so that drilling and other surveys could be conducted.

In July 1944 Britain again contacted Australia, asking that they be allowed to purchase '*all uranium concentrates produced in Australia'* and stated *'that the United Kingdom will be prepared to reimburse costs incurred by the Commonwealth Government in developmental work*'[22]. On the 21st February 1945 Britain '*indicated that unless production would amount to 100 tons in twelve months, they were no longer interested. It was estimated that approximately 20 tons could be obtained at Mt Painter*'[23]. Australia was able to supply some uranium but in very small quantities, '*sufficient for laboratory work*'[24].

The CSIR had been involved with this exploratory work in conjunction with the South Australian Mines Department and the Commonwealth Mineral Resources Survey. This exploratory work included experiments in the treatment methods for uranium ore.

While the world was still recovering from the initial shock of the first atomic bomb blast on a populated area, newspaper accusations started to ring out. Was Australia's uranium used in the Hiroshima bomb? Both the 'Daily Telegraph' and the 'Sydney Morning Herald' published these assertions on the 8th August 1945. Specifically the 'Daily Telegraph' stated:

> *'As a contribution to research on the atomic bomb, Australia mined uranium, the material from which the bomb derived its energy.*
> *The element was taken from an abandoned shaft at Mt. Painter, in an inaccessible part of the Flinders Ranges, in South Australia.*
> *The mining was one of Australia's most closely guarded war secrets ...*
> *The material from which the mineral was extracted was carried by camel to the railhead*[25].

Government officials were swift to reply and in a press release issued on the 8th August, it was stated that only small quantities of Australia's uranium had been sent to Britain and certainly not in a sufficient quantity to produce a bomb[26]. Debate on the issue raged over the next few weeks with the 'Herald', the 'Argus' and the 'Melbourne Herald' joining the fray. Finally the press wearied of this issue and became silent.

It became apparent to the far-sighted H.C. (Nugget) Coombs that Australia needed some form of policy relating to uranium-bearing ores. Consequently Coombs called a meeting for the 1st March 1946 of representatives from a number of different departments with interests in the area which included the

Departments of Defence, Supply and Shipping, External Affairs, Treasury, Attorney-General's and the CSIR[27]. As a result of this meeting and several subsequent meetings, the Prime Minister issued a press statement on uranium on 26th March 1946 in which he announced the Cabinet's decision for the Commonwealth to control all radioactive minerals, for their exploration and for research and application of these materials[28]. This statement became the basis for the Atomic Energy (Control of Materials) Act 1946.

This Act, to which Royal assent was given on 14th September 1946 gave control of all naturally occurring and man-made radioactive materials that could be used in atomic energy production (and hence in the production of atomic bombs) to the Commonwealth Government administered by the Ministry of Supply and Development[29]. It mandated that the discovery of all such deposits be reported to the Commonwealth and it prohibited (except under licence) the working with, production, possession, use, export and import of such materials. Finally it gave authority to the Commonwealth to enter any land or premises where such material may be stored and remove it[30]. This short piece of legislation gave the Commonwealth Government complete control of every aspect pertaining to radioactive materials that could be used for both military and peaceful uses and stopped any private ownership of these materials regardless of quantity.

This 1946 Act also allowed for the establishment of an advisory committee to assist the Minister in the administration of this Act. This committee was to have five members. It is unclear whether this committee was established. However, by September 1946 an Atomic Energy Research Advisory Committee had been established under John Dedman, the Minister responsible for the CSIR.

2.5 Australia and the United Nations Atomic Energy Commission

With the war at an end and the horror of atomic weapons exposed to the world, the newly formed United Nations had its first meeting in London in January 1946.

> *'On January 22nd, 1946, the United Nations Assembly unanimously adopted a resolution ... for the control of atomic energy by an Atomic Energy Commission which would consist of representatives of members of the Security Council and of Canada ... The Commission is to enquire into all phases of the problem and to proceed "with utmost despatch" ... The terms of reference of the Commission are to make specific proposals for –*
>
> *(a) extending between all nations the exchange of basic scientific information for peaceful ends;*
>
> (b) *the control of atomic energy to the extent necessary to ensure its use only for peaceful purposes; and*
>
> *(c) the elimination from national armaments of atomic weapons and of all other major weapons adaptable to mass destruction;*
>
> (d) *effective safeguards by way of inspection and other means to ensure against violations and evasions*[31].

The Security Council was made up of five permanent members: France, China, the Soviet Union, the United Kingdom and the United States, and five members who were elected for a fixed term: these included Australia, Egypt, the Netherlands, Poland and Mexico. It was in this capacity that Australia became involved. Many of the delegations had started to arrive in New York, the place where the first meeting of the Commission was to occur from early May. The Australian delegation was led by Doc Evatt who was assisted by two technical advisers, Marcus Oliphant and George Briggs (1893-1987). The

Australian delegation was in place immediately the Commonwealth Prime Ministers' meeting had concluded in London. As mentioned in the last chapter, Oliphant had agreed to join Australia's delegation in March; '*we were advised on 13th March that Professor Oliphant was prepared to act as Australian Technical Adviser*[32]. George Briggs had been Chief, Division of Physics of CSRIO during the period 1939-1945. It was from this background that he was invited to be part of the Australian delegation.

The Australian delegation started to immediately communicate Australia's position on atomic energy;

> *' the potential use of long-range atomic weapons constitutes a grave threat to Australia's security. The concentration of our population and essential heavy industry in relatively few and easily accessible urban areas makes Australia particularly vulnerable to methods of mass destruction ... Australia is directly interested in the matter of atomic research and the possible adaptation of atomic energy for industrial and peaceful purposes. The Australian Government is taking steps to investigate and control deposits of uranium or thorium ores ... We have therefore a special interest in promoting the widest exchange of basic scientific information and the provision of opportunities for Australians to participate in atomic research and production of atomic energy*[33].

On the 30th May 1946 Doc Evatt sent a secret cable to the Prime Minister in which he stated

> '*After consultation with and full agreement of Professor Oliphant and Dr Briggs, we proposed to proceed upon the following general basis in connection with atomic energy ... the general form of international*

control proposed in the Lilenthal-Acheson report[xxviii] *should be supported but ... requires modification for several reasons ... the proposals are designed to protect United States from atom bomb attack. It preserves her supremacy in atomic armament and industrial and scientific application for a considerable period. This will accentuate the disparity between the industrial power of the United States and other nations with smaller natural resources, such as Australia, in spite of the fact that the fundamental discoveries of atomic energy were made in Europe... the Lilenthal report asks Nations to hand over control of their raw materials in return for a promise of United States to reveal to United Nations at some indeterminate time, subject to Congress, its "Knowhow" factories and stocks of weapon*[34].

Evatt was now in daily contact with both his department and the Prime Minister. On 12th June he noted '*Oliphant and Briggs are proving of great assistance'*. On the following day he wrote '*Contact with the American experts, especially through Oliphant, suggests that the development of atomic energy for peaceful purposes could proceed more effectively and much more rapidly than was at one time thought practicable*[35].

The first meeting of the United Nations Atomic Energy Commission was to be held on 14th June 1946[36] at Hunter College in New York. The meeting opened with an address by the leader of the US delegation, Bernard Baruch. According to Paul Hasluck's report[xxix] of the meeting this address took up most of the morning's session. After this address '*the Commission then*

[xxviii] This report was produced a committee chaired by David Lilenthal, head of the Tennessee Valley Authority which was set up under Dean Acheson who was the US Under-Secretary of State. This report was presented to the United Nations as a possible template of how international control on nuclear development could occur.

[xxix] Paul Hasluck was Counsellor of the Australian Permanent Mission at the United Nations Headquarters.

adopted the principle of rotation of Chairmanship and Dr Evatt was invited to take the Chair[37]. Australia was now in a position in which it could greatly influence international events and Evatt was the man who could achieve this, with the influence and support of both Oliphant and Briggs. Needless to say Australia played its part proposing more amendments to the draft treaty than almost any other country. It was possibly at this meeting that Oliphant earned his reputation with the Australian government.

Oliphant and Evatt had returned to their respective homes within a few months but Briggs remained in New York until the end of 1947. On 31st March 1947 Briggs reported by cable '*probably more than nine tenths of the work of producing an atomic bomb is identical to that of producing nuclear fuel for peaceful purposes. Large scale development of the use of atomic energy means the potential to produce atomic bombs*'[38]. The United Nations Atomic Energy Commission continued to meet regularly until the end of 1947, by this stage too Briggs had returned to Australia. This first attempt at controlling the development of nuclear weapons resulted in a treaty but this treaty was not accepted by all members of the Security Council. There seemed to be little agreement between the US and the USSR, both of whom had permanent seats on the United Nations Security Council. The treaty proposed by the US would effectively prevent nations other than the US from developing nuclear weapons. This was not a situation that the other permanent members of the United Nations Security Council would endorse. Consequently, the United Nations Atomic Energy Commission would be disbanded and replaced in 1958 by the International Atomic Energy Agency.

In Australia, meantime, it was noted on 7th August 1947 that

> *'Australia will no longer be a member of the Atomic Energy Commission at the end of this year, at the same time, as a Convention on Atomic*

Energy may eventually be drafted, it will be necessary for an interest to be maintained in atomic matters ... It is thought that consideration might be given to establishing here in Australia a small technical committee which could study the documents and information of a technical nature received in the Department[xxx]*, and on which the Australian delegation should be informed or on which we may wish to express our views to the United Kingdom or to Canada.*

The members of such a Committee might be:

1. *An Officer from the CSIR, eg Dr White*
2. *An Officer from Mineral Research, eg Dr Raggatt*
3. *A physicist from one of the Universities*
4. *A Representative of the Defence department*
5. *A Representative of the department of External Affairs*
6. *Dr Briggs on his return to Australia*[39].

Again it is difficult to determine whether this particular committee was formed, but a committee was formed which was made up of the representatives listed above. There were, at this time, a number of different committees within the Department of Defence, the CSIR and other government instrumentalities that advised on matters pertaining to atomic energy or, more correctly, nuclear science.

Australia had, more from good fortune than by design, become involved in the international politics of atomic energy and its control. This was a position that Australia wanted to maintain. It was a new technology and at the time there was no reason to suppose that Australia could not join the elite technologically advanced atomic club, after all, many of her sons had been involved in the

[xxx] The External Affairs Department

development of the atomic bomb and were now working on the development of atomic energy. All Australia had to do was to convince them to return home.

In Australia most scientists worked either in the academic sphere within universities, or if they were involved in research, which in those days was what we now call pure research with no end use required to justify its existence, they worked for CSIR. The decision made by Chifley to obtain the 'secrets' of atomic energy would now put this well respected body under scrutiny.

2.6 Security and the CSIR

The CSIR initially carried out research that was related to Australia's export industries of agriculture, primary produce and mining. However, during the Second World War the dimensions of its research were broadened to include the development of military technology for the war effort. At the conclusion of the war, Chifley saw the necessity of not allowing the momentum and expertise that had been developed to be lost. In 1946 a number of different scientific and advisory groups were established with specific military purposes.

A Defence Committee Agendum[xxxi] dated 19th February 1946 states '*On the 25th January 1946, the Defence Committee with the Chairman of CSIR and the Controller-General of Munitions Supply gave consideration to the question of the establishment of a Defence Scientific Advisory Committee*'[40]. This Defence Scientific Advisory Committee was subsequently formed and first met on 30th March 1946. '*The function of the Committee should be to maintain*

[xxxi] The agenda of this committee included short reports that were to be considered at the meeting.

a general survey of the scientific field in order that it may bring immediately before the Defence Committee, the Chiefs of Staff Committee, or, through the Council of Defence, to the notice of the government, scientific developments having either direct or indirect bearing upon national defence'[41]. This Defence Committee was made up of the Defence Scientific Adviser as the chairman, a representative from CSIR (Dr White) and scientific representatives from the disciplines of physics (Professor Martin), chemistry (Professor Hartung) and medicine (Dr Burnet)[42].

Cabinet on 3rd April 1946 '*agreed to the establishment of a New Weapons and Equipment Development Committee*'[43]. This committee was established within the Department of Defence with Major-General L.E.Beavis (1895 -1975) appointed as its chair. The functions of this committee were to:-

'(i) *Advise on the machinery required for research and development of new weapons and equipment;*

(ii) Recommend the research and developmental projects to be undertaken;

(iii) Co-ordinate the execution of the research and development projects approved and

(iv) Maintain liaison with overseas counterparts'[44].

Beavis had been a career soldier who had served in both World Wars. In April 1936 he had been appointed as chairman of the Defence Resources Board which had been established to advise government on mobilising industry in the event of war. His service during the Second World War saw him serving with the AIF in the Middle East. He returned to Australia in April 1942. During 1952-4 he served as Australia's High Commissioner to Pakistan[45].

Britain, in the immediate post war period, was establishing its own atomic energy program which would later also include a program for the development of nuclear weapons and their delivery. At the Commonwealth Prime Ministers' meeting that was held in May 1946, Britain had made a request of all member nations for a supply of raw materials for this program. It believed that these materials could be found in member nations. The request was for member nations to '*investigate the development and supply of raw materials of importance to the program*'[46]. Britain was bound by the constraints of the Anglo-American agreements on Atomic Energy and hence could not share vital information with the Dominion nations. In return for raw materials, Britain offered '*places at Harwell for secondment of scientists*'[47].

According to Margaret Gowing, Britain had not expected much response from Australia, but was soon to discover otherwise;

> *'soon after the war, the immediate feeling about co-operation with the Dominions was that neither Australia nor New Zealand was likely to be of any consequence either industrially or as a source of raw material, but they would "presumably" have to be kept informed about the development of the project. On the other hand it seemed desirable to associate South Africa more clearly with the project than hitherto, because of her uranium*'[48].

Doc Evatt made it perfectly clear to the British that Australia was not only interested in atomic energy but intended '*keep abreast of the world in industrial atomic development*'[49]. Britain had not bargained for this turn of events nor for what was to follow.

When Chifley and Coombs returned from London they were determined to take advantage of the British offer. To its credit CSIR acted before official contact had been made and on 29th August 1946, CSIR wrote to the Prime

Minister's Department even before the Atomic Energy (Control of Materials) Act 1946 had been given assent, stating '*The Minister-in-Charge of the Council for Scientific and Industrial Research, the Honourable J.J.Dedman, has approved of the establishment by the CSIR of an Atomic Energy Research Advisory Committee*'[50]. The purpose of this committee was '*to advise the Executive Committee of CSIR in regard for its plans for atomic energy research*'[51]. The CSIR would now have a committee investigating aspects of nuclear energy and had established an Atomic Physics Section to enable research to commence.

As the committee was not restricted to members of the CSIR, a letter was sent on the 5th September 1946, from the Prime Minister to the Premier of South Australia, Thomas Playford, requesting the South Australian government to supply a representative for this committee. The suggested nominee was the Director of the South Australian Department of Mines and Government Geologist, Mr S.B.Dickinson (1912-1999). In his letter, Chifley states '*There are a number of matters which require discussion immediately. These include the sending of Australian scientists abroad to participate in atomic energy work, the development of methods of extraction of uranium from Australian ores and the development of fundamental nuclear physics work in Australia*'[52].

Playford accepted Chifley's nominee and, in his response dated 25th September, pointed out that South Australia was attempting to '*determine the extent and nature of uranium deposits in South Australia*'[53]. It is quite obvious that Chifley intended Australia to take up Britain's offer of seven research fellowships at Harwell in return for access to supplies of uranium[54]. Playford also wanted to develop his state's raw materials; his main concerns were for the availability of power and fresh water.

This Atomic Energy Research Advisory Committee was to include a Defence Department representative. On 9th September, Dedman wrote to Francis Forde who was still the Minister for Defence, requesting Defence Department representation on the committee. Dedman's note reiterated exactly the sentiments and the words expressed by Chifley in his letter to Playford[55]. Dedman then specifically mentioned that the suitable individual to represent the Department of Defence would be the '*Defence Science Adviser when he is appointed*'[56]. However, it became apparent that this appointment was expected to take some time so an alternative representative was suggested to act as the Defence Department representative until the Adviser's position was filled. The Defence Science Adviser position had become vacant in October 1947 when the incumbent, A.P.Rowe (1898-1976), accepted an appointment as Vice-Chancellor of the University of Adelaide, a position he held from 1948 to 1955[57]. The alternative representative was to be the Chairman of the New Weapons and Equipment Development Committee, Major-General Beavis. Beavis attended the second meeting of the committee on 12th December, and, in a memorandum to the Defence group of departments, it is reported that amongst other matters discussed, the committee had decided to invite Professor Oliphant to its next meeting on the 8th January 1947[58].

These various Committees seemed to function reasonably well until the first concerns of security were made on 21st January 1948. The concern first emerged in a note attached to the minutes of the sixth meeting of the Defence Scientific Advisory Committee. The then Defence Scientific Adviser, A.P.Rowe wrote '*the time has come to face the facts. Most of the members of the Committee are not much interested in organisation, but the greatest difficulty is the CSIR representation, since consideration of an organisation involves some delicate problems. Whatever I circulate to the Committee on*

this subject would go to the CSIR Executive and the results may be unfortunate'[59]. Rivett responded that he regarded Dr White as being a personal appointment to the committee and not a representative of the CSIR. However, the damage had been done. There was now a suspicion that these secret deliberations were being discussed openly at the CSIR. The two defence committees came under review.

The Defence Scientific Adviser, Professor Leslie Martin (1900-1983), was appointed on 25th October 1948 and held this position until 1968[60]. Martin was given the additional role as Chair of the Defence Research and Development Policy Committee. This committee had been formed in 1948 when the Defence Scientific Advisory Committee and the New Weapons and Equipment Development Committee were amalgamated. The function of this committee was to '*advise the Defence Committee on matters connected with the formulation of scientific policy in the defence field, including the machinery and major projects for research and development*'[61].

Leslie Martin was also Professor of Physics at Melbourne University, a position which he accepted on 1st January 1945. Martin wanted to '*create a major nuclear physics research school at Melbourne*'[62]. The group under Martin at Melbourne University was involved with fundamental research, specifically to train '*sufficient men to develop an atomic or nuclear energy stockpile*'[63].

The Defence Research and Development Policy Committee established the Atomic Warfare Sub-Committee which was also chaired by Martin. The functions of this sub-committee were reminiscent of an earlier committee and were to;

a) *advise on the machinery required for research and development of atomic weapons and equipment,*
b) *recommend the research and developmental projects to be undertaken, in relation to atomic weapons and equipment*
c) *advise on the co-ordination of the execution of atomic research and developmental projects, as approved*
d) *advise the Services through the Defence Research and Development Policy Committee on the technical aspects affecting the application of atomic energy*
e) *maintain liaison with its overseas counterparts*[64].

By 1947 there were a number of groups looking at the military aspects of atomic energy as well as the peaceful uses. The CSIR had, as mentioned earlier, established in 1947 an Atomic Physics Section which was essentially involved in the peaceful applications of atomic energy. In July 1947, Australia formally requested information about the British low-energy pile[xxxii], GLEEP, being constructed at Harwell[65]. Needless to say, Britain did not expect this turn of events from Australia. Eventually Britain decided to provide the information required provided that there were satisfactory security arrangements made by Australia. Rivett's response was;

> *'as to all this business about classified information, security, secrecy and the rest of it I just loathe it. Of course we shall be prepared to give whatever guarantees may be required if it is the only way we can engage in research work of any value*[66].

Eventually an agreement was reached and the first group of Australian scientists arrived in Harwell in 1948. The group of Australian scientists came

[xxxii] Pile is the term used initially to describe nuclear reactors, GLEEP stands for Graphite Low Energy Experimental Pile.

predominantly from the Atomic Physics Section within CSIR. The group included the following individuals;

D.F.Sangster, a chemist from the CSIR's Division of Soils,

O.O.Pulley, an electrical engineer and senior member of the group from the Division of Radiophysics,

C.Boadle, a mechanical engineer who did not return to Australia but joined Rolls Royce Ltd,

N.Faull, a physicist from the Division of Physics who died while at Harwell,

J.N.Gregory, a chemist from the Division of Tribophysics,

R.H.Myers, a metallurgist from the University of Melbourne and

G.L.Miles, a chemist who was at Cambridge on a CSIR Fellowship[67].

The Electricity Trust of South Australia, at the instigation of its Deputy Chairman, Stan Huddlestone, sent three scientists to Harwell; D.Griffiths, Eric Scarborough and Philip Williams[68]. Huddlestone was an early enthusiast of atomic energy and wanted this form of energy for South Australia. Almost all of these individuals would later play a significant part in developments within the Australian Atomic Energy Commission. However, in 1948 these Australians at Harwell were subjected to stringent security arrangements they had not experienced in Australia. This was the period of the Cold War with the Soviet Union and threats to national security, both British and Australian, were seen everywhere.

The need for security at Harwell and on atomic energy work in general had been necessitated by the Tripartite Agreement between the US, the UK and Canada and the passing of the McMahon Act in the US Congress. The discovery, in March 1946, that Alan Nunn May, a British physicist working in Canada during the Second World War, had passed atomic secrets to the Soviet Union, made the matter even more pressing[69].

There were accusations as early as 1947 that communist scientists were being employed by CSIR[70]. Oliphant summarised this attitude when he wrote '*The presence of men from CSIR, which has specifically rejected secrecy, in the Atomic Energy Establishment at Harwell and the fact that at least one Australian who served with the British team on this project in America has turned out to be a member of the Communist Party, add to their worries*'[71]. The different attitudes to security between the CSIR and both Britain and the Defence Department in Australia led to great pressure being placed on CSIR. At this time, the Chairman of the CSIR was David Rivett who had been appointed to this position in February 1946 after a long and distinguished career in the CSIR. Rivett objected to any secret scientific work being carried out in the CSIR, but he accepted that in time of war this was reasonable[72].

Rivett addressed the issue of secrecy in science when he spoke at the University College in Canberra in March 1947 stating: '*The CSIR and the universities must maintain in Australia the spirit of science, which can live only in an atmosphere of freedom. If a government wishes to prepare secretly for the destruction of other sovereignties they should not conduct it in research institutions which respect their traditional freedoms of science*'[73]. Rivett was an idealist who was looking to re-establishing the public nature of scientific research in Australia. Harold Breen (1893-1966), a senior Public Servant, commented about Rivett: '*He believed with all his being the duty of the scientist was to explore and publish his findings. He regarded any deviation from this as a betrayal of principle and disruption of the purpose for which CSIR was founded*'[74].

Despite Rivett's idealism, in September 1948 he was attacked in Parliament by the conservative Opposition and it was suggested '*that secret information*

to which CSIR officers had access was not adequately protected'[75]. Of primary concern was the nuclear work. This accusation was echoing the concerns of the US and Britain as to Australia's lack of security in nuclear matters. Despite the support from his Minister, John Dedman, and the Prime Minister, Ben Chifley, Rivett's accusers would not be silenced. It appeared that the CSIR was full of individuals who could be potential spies and hence threaten Australia's national security.

The government was now forced to reconsider the structure of the CSIR and bring it under the control of the Public Service Board. This control would ensure that each applicant to the organisation would be screened by an independent authority and, further, that the organisation as a whole would be more accountable for all its financial transactions. The Dunk-Coombs Act passed on 18th May 1949 reconstituted the CSIR as a new organisation, the CSIRO[xxxiii]. Rivett retired from CSIR on 2nd April 1949[76].

2.7 ASIO

Sir Percy Sillitoe, Head of Britain's MI5, visited Australia in February 1948. During his visit he met Ben Chifley and attempted to convince him to allow MI5 to investigate certain security breaches which were thought to have occurred in Australia. It is of interest to note that at this time MI5 was itself riddled with Soviet agents as was the British Foreign Office. Chifley needed little convincing concerning the state of security in Australia since, on 18th November 1947, Chifley had written to his Ministers that '*Australian participation in such important Defence activities as the Long Range Weapons Project ... emphasises the necessity for the highest degree of security*'[77]. Australia had just become involved in the joint Australian-British Long Range Weapons Project. This project was to be located in an isolated

[xxxiii] CSIRO stands for Commonwealth Scientific and Industrial Research Organisation.

part of central South Australia and the nearby town which would be built was to be called Woomera[xxxiv]. Woomera was to become the base at which rockets with the capability of carrying atomic warheads would be launched and tested. This project was, of course, highly classified and dependent on cooperation between Australia and Britain and between the US and Britain.

Chifley, together with Evatt and in consultation with the MI5 officers in Australia, decided to set up a new security organisation. Initially its establishment was by 'decree', with neither the Cabinet nor the Governor-General being informed. This new organisation was to act in the defence of Australia, although it still required some type of formalised structure to allow it to operate[78]. The events of the next few months would bring this organisation to the fore.

The need for an independent security organisation in Australia became even more evident in May 1948, when the US banned the transmission of all classified information to Australia. At this time the US made it clear to Britain that the ban on all classified information would stand until Australia organised some form of improved security[79]. Chifley went to Britain in July 1948 for discussions with Attlee, which included attendance at a British Cabinet meeting. Minutes of this meeting state that '*Mr Chifley was most anxious to remove any impediments on the free exchange of secret information about atomic energy development between the Governments of the U.S., U.K. and Australia and he was prepared to make any adjustments ... in the constitution of the Scientific Organisations serving the Australian Government*'[80].

Chifley returned to Australia later that month and announced that Australia required '*a freestanding, powerful security organisation*'[81]. Chifley had

[xxxiv] Woomera is an aboriginal word which means throwing stick.

discovered that the crisis between Australia and the US was caused by allegations of espionage occurring within Australian scientific organisations. He now could present the legislation required to establish this security organisation and by March 1949 the new organisation, ASIO, was established. ASIO's function was to '*guard Australia against subversion, sabotage and espionage*'[82]. One aspect of this function was to screen all applicants for employment in the Commonwealth Public Service and this now included future employees of CSIRO and all other Commonwealth employees which would later include the officers of the Australian Atomic Energy Commission.

2.8 Long Range Weapons Project

Australia, in 1946, under Chifley's leadership attempted to become self sufficient. The Snowy Mountains project was established to provide a dependable water supply to the new irrigation areas of NSW and Victoria and to also supply additional electric power to both states. Chifley wanted access to the new technology of atomic energy and the defence capability that came with it. Australia, as an isolated continent lacking external military bases, could not possibly deliver an atomic weapon by aircraft as the US had done. Australia's isolation from potential enemies meant that the delivery mechanism of any atomic warhead would be by some form of rocketry. Britain also wanted a missile defence capability and also needed a testing range for such a weapon.

As early as October 1945 a conference was held in Melbourne to discuss the suggestion from Britain that the British '*testing and research facilities for the full scale development and testing of guided projectiles should largely be moved ... to Australia. An area extending from the vicinity of Port Augusta, in*

the direction of Broome, was indicated as possibly being suitable'[83]. Australia saw this proposal as advantageous from both defence and civilian perspectives. The only concerns voiced were those of the nature of Australia's participation and access to information from Britain[84].

Britain initially considered Canada, but the long bitter winters there militated against the use of Canada as a testing range. Australia was the next possibility and the Chifley Government made it quite plain to Britain that Australia wanted to play an active role in the development of the Long Range Weapons Project. Dedman, as Minister for Defence, presented to Cabinet, in November 1946, a proposal in which Australia should become a full partner in the project. He proposed that the Department of Defence should be responsible for liasing with Britain on the project and the Department of Munitions, later to become the Department of Supply, should be responsible for the implementation of this project[85].

The joint Australian-British Long Range Weapons Project came into being, and as discussed in the previous section, was located in the isolated desert area of Woomera in South Australia. The development of this project did not start for a number of years and it would be the Menzies Government that would complete it. This project also required military secrecy. When the small town of Woomera was required to be built in the middle of the Australian desert there was a need for a large work force, and one of the first roles for the newly established security organisation, ASIO, was the vetting of all those employed on the project, from the labourer to the senior scientist.

2.9 British Atomic Testing

The British had decided, in January 1947, that it would proceed with an atomic bomb project[86]. The laboratories at Harwell could produce the materials required for a nuclear device, but Britain needed somewhere to test these devices. Britain's preferred location was to use a site in the US but relationships between Britain and the US were beginning to cool since there was some disagreement between the two nations as to the sharing of information gained during the Manhattan project and will be discussed in more detail later in this chapter. A second possible location would be Australia.

Chifley had called a general election in December 1949 which he lost in a landslide. The new Prime Minister was Robert Menzies. Menzies would now hold the Office of Prime Minister until 1966 and many of Chifley's initiatives would come to completion during this period[87].

The British approach to Australia did not occur until September 1950. Attlee sent a cable to Menzies outlining the problems that Britain was experiencing. Attlee stated that he anticipated the weapons testing would commence in 1952. Britain was informed that Australia, in principle, would allow the tests to be performed on Australian soil. However, Menzies had not consulted his Cabinet or Parliament. Instead he consulted the British nuclear physicist, Ernest Titterton, who had recently arrived in Australia to take up the Chair of Physics at the Australian National University[88]. The British and Australian task force recommended that the Monte Bello Islands, located off the north-west coast of Australia, would be the place for the first British atomic tests[89].

The Department of Supply would be responsible for providing the infrastructure. Howard Beale was the Minister for Supply but he did not know of the tests until he was informed of them by the Permanent Secretary to his

Department, Major-General Jack Stevens(1896-1969). It appears that Menzies had instructed Stevens to oversee the provisions for the British tests but Stevens was ordered not to discuss the matter with anyone and to proceed with utmost security with this project. Stevens apparently suffered from pangs of conscience when he discovered that his own Minister knew nothing of the tests and felt obliged to inform Beale[90].

It is of interest to note that when Beale came to the Ministry of Supply his first Permanent Secretary was Harold Breen who had been an admirer of Ben Chifley. As Permanent Secretary of Supply, Breen was responsible for the establishment of the Woomera Rocket Range and the development of the town[91]. Breen, who had been transferred from Supply in 1951[92], became Permanent Head of the Department of Defence Production in May 1951 and remained in this position until his retirement in 1957[93].

The first atomic test took place on 3rd October 1952. Witnessing the explosion were three Australian scientists: Ernest Titterton from the ANU, Leslie Martin from Melbourne University and W.A.S.Butement who was Chief Scientist of the Australian Department of Supply[94]. In the period from 1952 to 1958 there were nine British atomic bombs detonated on Australian soil: one at Monte Bello in 1952, two at Emu Fields, in the Maralinga region of South Australia in 1953, two at Monte Bello in 1956 and four at Maralinga in 1956[95]. Britain left Australia the legacy of high levels of radioactive contamination at the Maralinga site which still remains despite a number of attempts to clean it up and remove it.

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[1] p121 Crisp, L F 'Chifley, A Biography' Longmans 1963
[2] *Ibid*
[3] p186 Crisp
[4] p132 Crisp
[5] p183 Crisp

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3 THE BIRTH OF THE COMMISSION

3.1 Introduction

The period from 1945 to 1950 was a period when Australia was looking to protect itself against the possibility of another war. Australia had learnt certain lessons from both world wars and was determined not to repeat them. Australia now had a most effective social welfare system that supported the returning servicemen and women and assisted them to return to civilian life so the economic and social upheavals caused by the consequences of the First World War would not revisit the nation.

The Second World War had shown Australians how vulnerable and dependent on outside support they were. Politicians and public servants alike attempted to establish organisations which would serve Australia's defence in any future wars. A.P.Rowe, the Defence Scientific Adviser, wrote on 16th March 1948: '*We shall need novel devices for the next war as we did for the last one. With conditions as they are in the United Kingdom, it is time that Australia played her part in initiating and evolving novel devices or scientific concepts of war*'[1].

Defence was not the only consideration. The development of electrical power was essential for Australia's development, especially in view of the serious shortages after the war. One aspect of this was the development of a new form of power, nuclear energy, which gave the promise of cheap and plentiful electrical power and even had the possibility of powering large desalination plants so that cities could be established in the dry and uninhabited regions of Australia. The need for industrial and peaceful applications was now a priority, but how was it to be achieved?

3.2 Industrial Atomic Energy Committee

As was mentioned in the previous chapter, Britain was approached by the Australian and New Zealand governments, in July 1947, for information about the Harwell reactor, GLEEP. At the time the two countries were attempting to develop a joint policy on atomic energy. According to John Symonds, Doc Evatt was enthusiastic about the possible uses of atomic energy in Australia and had requested a copy of the report which led to the establishment of Harwell[2]. It is obvious in retrospect that Australia was interested in exploiting atomic energy and had started to set up an infrastructure to allow this to happen.

A number of defence committees had been established to look at the nuclear question from a military and defence point of view, this was discussed in the previous chapter. The CSIR and Melbourne University both had groups of nuclear scientists involved in the pure research aspects of nuclear physics and seven scientists had been sent to Harwell for training under an agreement with Great Britain.

In April 1948, Major-General Beavis sent a note to the Secretary of Defence in which he claimed to have made notes from an address made by Marcus Oliphant to the Atomic Developments Sub-committee on 23rd March 1948. Beavis stated that '*it is proposed to submit this report for notation by the new Weapons and Equipment Development Committee and the Defence Committee*'[3]. It is difficult to ascertain where this address took place and what Oliphant had actually said and what Beavis inserted into the report. It should be noted that the content at the time would have been highly classified by the British and one wonders if Oliphant yet again cared little for the notion of military secrecy as applied to science. Beavis' notes included the following;

> *' Plutonium is being produced for experimental purposes, and the United Kingdom is looking ... to improved production of this material. The object of the Harwell activities is mainly pile design and production of materials for research purposes. Uranium is used in the natural state in the Gleep and Bepo[xxxv] piles[4].*

The remainder of the report discussed the different types of reactors then being explored and even the possibility that Britain may choose to site one of these in Australia. The report does discuss some aspects of the developments of nuclear weapons and their delivery systems. It appears quite obvious that the Defence Department personnel had the notion of Australia having a nuclear weapons capability on their agenda but it is difficult from this report to ascertain if that was Oliphant's approach or merely Beavis' interpretation.

John Dedman, as the minister responsible for the CSIRO, on 27th June 1949, wrote to the Minister of Defence (one notes with some amusement that the Minister of Defence was also John Dedman), stating that '*The executive of CSIRO has recently advised me that it is difficult for it to formulate future policy on many different aspects of atomic energy with which the Commonwealth Government may be concerned without collaboration of your Department of Defence and of the Department of Supply and Development*[5]. He suggested that a group of officers from the CSIRO, the Department of Defence and the Department of Supply should meet '*with the view to advising the three Ministers concerned as to the interdepartmental machinery which should be set up to advise Cabinet on policy matters*[6] concerning atomic energy. By 26th July a group representing the CSIRO, the Department of

[xxxv] BEPO means British Experimental Pile Operation

Defence and the Department of Supply and Development met at CSIRO Head Office in Melbourne[7].

This meeting recommended the formation of an Atomic Energy Policy Committee. Initially this committee was to have representatives from the Departments of Defence and of Supply and Development, a representative of CSIRO and three technical experts, under the chairmanship of Marcus Oliphant[8]. Oliphant had '*agreed with the view that Defence and other aspects of Atomic Energy could not be separated*'[9]. However, in a note sent to the Secretary of Defence by the Acting Secretary, it became obvious that the Minister of Defence '*did not wish Defence to be associated at this stage with CSIRO on the committee, although he did say that Defence could be added later.*' The rationale for this Ministerial decision was evident later in this note '*He (Dedman) mentioned that the government was desirous of setting up an atomic pile in South Australia for the generation of electrical energy as a counterpart in that State to the Snowy River Scheme*'[10].

The Defence Department reconciled itself with the prospect that Professor Martin was to be appointed to the committee as one of the technical experts. Since he was already the Defence Science Adviser he would be in a position to advise the Defence Department of the machinations of the committee. Dedman, in his role as Minister-in-Charge of the CSIRO, amended the recommendation to replace the representative from the Department of Defence with a representative of Treasury. The work that needed to be done included the exploration for uranium ores and the extraction of uranium from them, the training of scientists and engineers in nuclear practice, and the possible development of a nuclear power reactor which would be capable of producing energy for industrial purposes[11].

This committee was later renamed as the Industrial Atomic Energy Policy Committee and was established on 19th August 1949 by Chifley. It was to advise the government on the possible industrial applications of atomic energy and to suggest a program for its development. It was answerable to the Minister responsible for the CSIRO[12]. Oliphant was to be the Chairman and the other members of the committee were representatives of the Departments of Supply and Development, Treasury and the CSIRO and '*three technical men, familiar with the physical, chemical and minerals problems that will require consideration*'[13].

Oliphant initially was involved with the works of the committee by correspondence but was to take a more active role on his return to Australia in 1950[14]. Menzies, who by this time was the Prime Minister, endorsed Oliphant as chairman but also included his own nominees, one of whom was Professor Philip Baxter. Baxter claimed that he had been invited to join this committee in January 1950 by Menzies who sent a the following message to Baxter whilst Baxter was enroute to Sydney :*'I am setting up a committee to study the Australian requirements of nuclear energy, would you like to be a member?'* [15] Since Menzies did not establish this committee one needs to question the accuracy of Baxter's recollection. Suffice it to say that Baxter joined the committee. The other members of the committee were to be: F.White, Professor L.Martin, Dr H.G.Raggett, H.Breen and H.Goodes[16].

Frederick White (1905-1994) was appointed as the Chief Executive Officer of the CSIRO in May 1949 when the CSIR was restructured to form the CSIRO. White had been one of the authors of the legislation that established the new organisation[17]. Professor Leslie Martin was appointed to the committee as a technical expert, but it has since become apparent that he was also on the committee as a covert Department of Defence representative[18]. Dr Harold

Raggett (1900-1968) was appointed as the first Director of the Bureau of Mineral Resources, Geology and Geophysics when it was established in 1946. He was appointed Permanent Head of the Department of National Development in 1951, a position which he held until his retirement in 1965. After his retirement he remained active, serving as an adviser to a number of organisations and companies[19]. Harold Breen was a career public servant who in 1949 was the Secretary to the Department of Supply and Development and in 1951 was promoted to the position of Permanent Head of the Department of Defence Production, where he remained until his retirement in 1957[20]. H.Goodes, another career public servant, was the Treasury representative on the committee.

From the membership of this committee, it appears that the majority of the public servants were in some way involved with various aspects of national defence, and it seemed to many that this committee was an arm of the defence establishment. The presence of Oliphant as the chairman seems at variance with such a claim, but, as later events would demonstrate, this defence-oriented group of individuals held a great deal of power and were ultimately responsible for Oliphant's dismissal from the committee.

Oliphant was an active chairman and made independent submissions to Menzies concerning the development of atomic energy in Australia. When Oliphant discovered, in February 1951, that Menzies did not see Mr Clement Attlee, the then Prime Minister of the United Kingdom, to discuss '*cooperation in the field of atomic energy*'[21], Oliphant went so far as drafting a note to Attlee stating that '*Detailed exploration of uranium ores at Radium Hill in South Australia has proved that at least 600 tons of uranium is recoverable as oxide*' [22] and that since a joint program of development would be useful to Australia, '*authority be given for technical discussions*' between Oliphant and Cockcroft

who could then make recommendations in the development of atomic energy in Australia[23]. This draft letter, based on a report that Oliphant had prepared on behalf of the Industrial Atomic Energy Policy Committee, which recommended the adoption of an atomic energy program in Australia, was sent to Menzies, by Oliphant, with the instructions that Menzies ought to send it to Attlee. Menzies obediently cabled this letter, unaltered, to Attlee who responded that there were issues of security due to the constraints of the tripartite agreement and that not all information available to Britain could be freely passed on to Australia[24].

Specifically Attlee's reply stated '*We have to regard our commitments under the tripartite agreement between the United States, Canada and ourselves. Complete separation of power and military programs for the use of atomic energy is not possible and a worthwhile program for industrial power could not be carried out without the use of classified information. ... In these circumstances we should in the first place need to have from you assurance that any Australian project in the industrial field would be dealt with as 'classified' to the extent that this is necessary under the rules agreed with the United States and Canada.'* The response concludes with '*This need not, however, hold up essential preliminary work such as ore mining operations'*[25]. Quite clearly Britain was unwilling to share information but it still wanted its uranium ore.

Oliphant was shown a copy of this response and in return responded, on 28th May 1951, with a willingness to accept the notion of secrecy of any information made available from Britain. He concluded: '*Assuming that the Government agrees to 'classification' of work on atomic energy, I assume that the project must be transferred to a Ministry which has the necessary machinery for dealing with classified information*[26]. When Oliphant wrote his

response to Menzies he was unaware that other intrigues lay behind Attlee's reply and these were still taking place, as will be demonstrated below. Further the Oliphant's original note and Atlee's reply had a greater readership than Oliphant had expected. Even before Oliphant had a chance to write a reply to Attlee's response other members of the Industrial Atomic Energy Policy Committee were being brought secretly into the discussion.

The first shot was fired by Harold Breen, on 23rd April 1951 when he sent a copy of Menzies' letter to Attlee, with Attlee's response, to the Secretary to the Department of Defence, with a cover note stating that '*No member of the Committee was aware of the first cable*[27]. The Secretary of Defence responded saying that the Defence Department had no official representation on the Committee. By 4th May, Breen had met with two other members of the Committee, Martin and White, who were in general agreement as to what should be done. They produced a report that was critical of Oliphant's views on atomic energy, suggested that the Committee would need to be reconstituted, and, more ominously, '*we want to know authoritatively if the U.K. Government desires help on the military side, in what way you think we can help; and then assess our capacity to give that help, always remembering that for local political reasons we should shape our course as to show by those steps we have moved closer to ultimate use of atomic energy in industry*[28].

The cover note to this report was written by Breen and sent to Menzies on 7th June 1951. Breen refers to the issue as the 'Oliphant-Uranium matter'. The final paragraph of the cover note states: '*I am particularly anxious to know if any Australian scientific help may be needed by the United Kingdom in Australia in the near future because of a certain event which is being planned and which may occur in Australia. You are aware of this possible project.*

White and Martin do not know[29]. This is a reference to the forthcoming British atomic tests which were to be held in Australia commencing in 1952 and were discussed in the previous chapter.

Oliphant's reply of the 28th May drew a 'slap on the wrist' by the Secretary of the Prime Minister's Department , suggesting that Oliphant should meet with the Industrial Atomic Energy Policy Committee and present a report from the whole committee. Oliphant does what he is asked[30]. The Committee met and recommended that it be disbanded and replaced by a new committee '*constituted under one of the Departments of the Defence group*'[31]. The committee also formulated a response to the British Prime Minister. According to Baxter, '*the committee met for half an hour and passed a single resolution ... that the committee should be wound up*'[32]. Breen was responsible for circulating the committee's recommendations and organising meetings between the other Secretaries of the Departments of the Defence Group which included the Departments of Defence, Supply and Defence Production[33].

In a note dated 4th September 1951, it is quite evident that part of the action taken against Oliphant was based on Oliphant's impatient and pacifist stance. '*Dr. White informs me that the other members of the Australian Atomic Energy Committee disagree with Professor Oliphant ... General opinion among scientists was that industrial application of atomic energy was not likely in the near future either technically or from the point of view of availability of raw materials*'[34]. This type of response was extraordinary, since the Radium Hill deposits were about to be exploited and there were several nuclear reactors in Britain and the US that were already operational. One can only conclude that the Menzies Government was more interested in the defence applications of nuclear physics than the industrial applications.

The machinations of the Secretaries of the Departments of the Defence Group resulted in The Industrial Atomic Energy Policy Committee being reconstituted under the Department of Supply. Howard Beale, the Minister for Supply wrote to Menzies on 10th October 1951 outlining the structure of the committee and its terms of reference. The Committee was '*to advise on all aspects of Australia's policy concerning –*

(i) the exploration for uranium ores,

(ii) the development of ore resources, and

(iii) research and development in the field of atomic energy in Australia' [35].

The suggested composition of the committee would be:-

Chairman, Secretary of the Department of Supply	J.Stevens
Secretary of the Department of Defence Production	H.Breen
Department of Defence representative	Professor Martin
CSIRO representative	F.White
Ministry of National Development	H.Raggatt,
and a representative from Treasury.	

Baxter was seen as someone that the committee could consult as required but Oliphant was completely left out, Beale stating '*Professor M.L.Oliphant came immediately to mind. ... it occurred to me that membership of this Committee, which is to consider problems associated with the application of atomic energy over the fields of industry and defence might embarrass him*'[36].

Although the Committee structure was in principle agreed to, there was still the problem of whether its new structure would be acceptable to the United Kingdom with whom Australia wanted so desperately to collaborate in the

development of atomic energy. Communications with Britain took a number of months to complete. Nevertheless, the committee structure was acceptable to Britain and *'the British Authorities would welcome Australian collaboration in the development of atomic energy for industrial purposes ... The United Kingdom is prepared to allow an Australian group to work at Harwell on the early stages of an Australian project*[37].

Howard Beale sent a letter on 4th April 1952 inviting the respective Departments to nominate their representatives. Oliphant, however, would not hear about the changes to the new committee until almost three weeks later when he received a letter from Menzies asking him to act as a consultant to the committee. Oliphant's response was reminiscent of his responses to being left off the MAUD Committee and later being left off Tube Alloys. He objected vociferously[38]. A copy of Oliphant's letter was sent to Sir John Cockcroft at Harwell who agreed with Oliphant that the new committee should be supported by a Technical Advisory Committee and nominated Baxter as a possible chairman of such a committee, with Oliphant, Rupert Myers and Professor Martin as members.

Security is not specifically mentioned either in the letter sent to Oliphant or in any Departmental correspondence. Yet it is well understood that Oliphant's reputation for being outspoken and his disregard for the processes of security may have also contributed to his dismissal. The Secretary of the Department of the Prime Minister, Mr A.Brown, sent an undated note to the Prime Minister in early 1955, '*Of course, if we are thinking of people who are household names in the atomic field in Australia, two spring to mind at once – Professors Oliphant and Messel*[xxxvi] *... However, I know that both have been considered*

[xxxvi] Harry Messel was head of the School of Physics at the University of Sydney and a vocal supporter of nuclear energy.

by Defence and Supply and they have not been recommended'[39]. The note is located in a file that deals with membership of the Safety Committee for Australian Atomic Weapons Tests and is located in the Australian National Archive, Canberra. It is quite clear from this note that by early 1955 Oliphant is certainly seen as a security risk. Another note in the same file, dated 1957, states '*public safety is Australia's special concern, but I would be surprised if the United Kingdom were happy about a further half a dozen or so outsiders being intimately brought into their tests eg ... Oliphant (ANU) ... besides problems of personalities and differing political views and philosophies, there is the security risk created simply by increasing numbers*'[40]. Oliphant amongst others is not seen as having suitable personality or the appropriate political or philosophical views for an appointment to a committee dealing with sensitive military material.

The final composition of this newly constituted Industrial Atomic Energy Policy Committee was:

J.Stevens	Department of Supply
L.Martin	Department of Defence
F.Wheeler	Department of the Treasury
D.Hibberd	Department of the Treasury
J.Cochrane	Department of Defence Production
H.Raggatt	Department of National Development and
F.White	CSIRO[41].

The committee was almost ready to start functioning but several issues of security had to be decided. The committee functioning under the Department of Supply was not considered sufficiently secure. On the 2nd May 1952, The Director General of Security wrote to Menzies informing him that '*The United Kingdom Security Service has further expressed the opinion that the*

Australian Security Intelligence Organisation should be responsible for advising the government, either by the appointment of an ASIO officer to act as special security officer to the Committee, or by means of advice to be given to the normal department security officer as and when it is necessary.' The Prime Minister's Department responded with an agreement that '*ASIO should be responsible for the normal security requirements of the departments concerned with atomic energy*'[42].

Within days of the formation of the newly reconstituted Industrial Atomic Energy Policy Committee, its chairman, Major-General Jack Stevens, produced a report which was forwarded to the Prime Minister and recommended that the number of CSIRO staff at Harwell be increased and that a suitable project be found for them to work on while being trained at Harwell; that a small group of people be employed in Australia to research local aspects of the same project; and that a separate organisation be established whose purpose was to be atomic energy and that all persons involved with this organisation be subject to security arrangements[43].

Jack Stevens was a career Public Servant who joined the Post Master General's (PMG) Department in 1915. When the First World War commenced he enlisted in the AIF rising to the rank of Lieutenant in 1917. When he returned from the war he returned to the PMG and also enlisted in the militia, by 1929 he had reached the rank of Lieutenant-Colonel. At the outbreak of the Second World War he again enlisted in the AIF and served in New Guinea. By the end of the war he had reached the rank of Major-General. He again returned to civilian life and in 1946 was the General Manager and Chief Executive Officer of the Overseas Telecommunications Commission (OTC) where Patrick Greenland was Secretary. Stevens must have had a good working relationship with Greenland because Greenland was appointed to the

position of Secretary of the newly established Australian Atomic Energy Commission in 1953. In 1950 Jack Stevens became the Secretary of the Department of National Development and assumed responsibility for the development of uranium mining at Rum Jungle. In 1951 he became Secretary of the Department of Supply[44].

The Atomic Energy Policy Committee was to advise the Australian government on the exploration for uranium ores, the development of ore resources and research, and development in atomic energy[45]. According to Moyal, this Committee '*recommended that; Australia should make use of uranium resources to gain nuclear knowledge and expertise overseas, Australia should become an independent participant in the development of nuclear science and technology by training nuclear experts in related disciplines and that Australia should initiate a research program*[46]. The committee remained in existence until November 1952 when it was reduced in size and changed in composition to allow for the easy transition for the new Commissioners who would run the new organisation once the Atomic Energy Act 1953 was enacted[47].

The Technical Committee that Cockcroft had recommended[xxxvii] was subsequently formed as the Scientific Advisory Committee and was established as a committee of the Australian Atomic Energy Commission. Cockcroft's nominees were all accepted.

3.3 Atomic Energy Act 1953

The Atomic Energy Policy Committee's recommendations were enthusiastically accepted by Menzies. The Atomic Energy Act was introduced

[xxxvii] See page 75

to Parliament in March 1953 and enacted with strong assent of the Labor Opposition in April[48]. The Act established the Australian Atomic Energy Commission (AAEC) and defined all its functions, responsibilities and necessary security arrangements.

When the Act was first presented to Parliament, the Minister of Supply Mr Beale underlined that the commission would concern itself with research and development in '*uranium and atomic energy for industrial as well as defence purposes*'[49]. The theme of defence was also echoed by Dr Evatt[50]. The second reading of the Atomic Energy Act 1953 gave particular emphasis to the defence aspects of Australia's development[51]. Defence had once again been used to justify the establishment of an organisation within Australia. Hence the AAEC would be seen by many within the Australian community as an arm of the Defence Departments and its employees would over the next few decades be regarded not as the independent scientists they were, but as employees of a defence organisation. This type of misconception would continue to dominate much of the debate on the issues of nuclear energy in Australia. It is interesting to note that the scientists and engineers who were later to be recruited to the Commission did not see themselves as working for defence but regarded themselves as working for an institution similar to the CSIRO.

Under the Act the Australian Atomic Energy Commission was responsible for the Commonwealth's operations in all fields of nuclear energy. Specifically, the AAEC was:

- charged with cooperating with the states in the exploration for, the mining, the treatment and disposal of uranium ores,
- responsible for operating and constructing plants for the liberation and conversion of atomic energy into other forms of energy

- responsible for the training of scientific researchers, carrying out of research and investigation in connection with matters associated with uranium or atomic energy[52].

The Commission also had the power to purchase land, construct buildings and purchase machinery, plant and equipment and of course to dispose of these. The Atomic Energy (Control of Materials) Act 1946 and the Atomic Energy (Control of Materials)Act of 1952 were repealed, thus placing the control of radioactive materials under the direction of the AAEC. In the section which places the control of these materials with the AAEC, defence is clearly mentioned. However, this is the only section of the Act which deals with defence. Further, the issue of security is specifically mentioned in the Act with penalties for breaches of security or secrecy laid down[53]. '*The AAEC scientific staff in the late 1950s were asked to attend lectures by ASIO officers and urged to behave sensibly and conscientiously on security issues, though almost none of the documents seen by them in the normal course of their duties was classified*[54].

Figure 3-1 The First Commission

Sir Jack Stevens (Chairman), Professor J.P. Baxter (Deputy Chairman) and H.M. Murray
Courtesy ANSTO

The Act allowed for three Commissioners (see Figure 3-1); the three included the Chairman, Major-General Jack Stevens (former Secretary Department of National Development and Secretary of the Dept of Supply), the Deputy Chairman, Professor Baxter and Mr Hugh Murray (research metallurgist and General Manager of Mt Lyell Mining Company)[55]. Oliphant was not included at this level and would never again play a significant role in the development of nuclear energy in Australia. However, he was still seen by many, especially journalists, as the spokesman on nuclear issues and was consulted on these from time to time for the remainder of his long life.

According to Moyal, the AAEC was both the promoter of an atomic energy policy and the exclusive source of technical advice to government on atomic energy[56]. Consequently it could be seen that the AAEC had been handed a complete monopoly by the government on the issue of atomic energy. This apparent monopoly and the secrecy provisions in the Act would in future years be the basis of a sense of mistrust between the Australian Atomic Energy Commission and the Australian public who questioned Australia's policies in atomic energy. However, in the period of the Cold War, the euphoria of Australia joining the exclusive atomic club was not to be undermined by these considerations.

3.4 The Commission; an Independent Body

The Commission came into being in 1953 with its three commissioners in place. At the time it had few staff and required a location from which to work. The Commission found such a location in the Commonwealth-owned building at 45 Beach Street, Coogee. It had recently been vacated by the Department of Social Services and the AAEC was to rent it until 1959 when the building was finally bought by the Commission[57]. Once the Commission found its

home, it now needed a staff. Some secretarial appointments had already been made in the period during which the Atomic Energy Policy Committee had been established, but the Commission needed scientific staff and there were scientists from various groups already engaged in atomic research.

The Commission's first task was the establishment of its scientific program and at the same time to bring together any scientific expertise. Hence Professor Martin's group of CSIRO and Department of Supply scientists from Melbourne University were transferred to the AAEC and became its first scientific employees in Australia[58]. The group of seven individuals from the CSIRO who were already at Harwell were transferred into the Commission as was Professor Martin's group from Melbourne University who were also at Harwell.

Later, the Commission would actively recruit scientists many of whom were sent initially to Harwell and somewhat later to the US for training. Philip Baxter visited atomic energy laboratories in Britain, US and Canada. Lord Cherwell, who was a member of Britain's Advisory Council on Science Policy, promoted an agreement between Britain and the AAEC for collaboration on uranium supplies and expertise[59]. Agreements between Australia, UK, US and Canada meant that AAEC staff could be stationed in those countries[60].

The Act establishing the Commission allowed for the establishment of Advisory Committees '*as it considers necessary for the efficient performance of its functions*'[61]. The number of these advisory committees, their membership and their functions would be determined by the Commission[62]. In its first few years the AAEC set up the following committees:-

- The Advisory Committee on Uranium Mining (June 1953) with Murray, F.Anderson (Consolidated Zinc Proprietary), J.Kruttschmitt (Mt Isa

Mines Ltd) and H.Raggatt (1900-1968) (Secretary of Department of National Development) as members. This committee would remain unchanged for almost 20 years[63].

- The Scientific Advisory Committee (Oct 1953) with Baxter, Oliphant, Martin, Rupert Myers, F.White and V.Brain from the Electricity Authority of NSW. This committee would change and evolve until 1964 when it was abolished[64].
- The Business Advisory Group (Nov 1955) had a large membership from government, private industry and the scientific communities. This group would also remain fluid with its membership changing over the years until it too was abolished in 1964[65].
- The Safety Review Committee (1962) with S.Sunderland, C.Cummins and D.Stevens as members.

These Advisory Committees were allowed to advise the Commission only on matters which the Commission presented to them. They had little power or control over what happened within the Commission and had purely an advisory capacity.

The Atomic Energy Act 1953 made specific reference to uranium and other fissionable materials. Under the Act all discoveries of uranium and related ores in Australia had to be reported to the Commission[66]. The AAEC was responsible for every aspect of uranium exploration and its exploitation. Until 1966 uranium mining was essentially a small scale activity and the only mines were at Radium Hill in South Australia and at Rum Jungle in the Northern Territory[67]. Consequently a brief discussion of the history of uranium exploration and mining is required.

3.5 Uranium

The discovery of uranium in Australia and the ultimate exploitation of this discovery is a long and convoluted story. It is one that starts then stops then starts again. Australian uranium was first discovered in Carcoar NSW in 1898, where torbernite was found in association with cobalt[68]. Uranium was also found in 1910 at Mt Painter in the Nth Flinders Ranges and in 1906 at Radium Hill near Olary S.A. where it was first mined[69]. At this time uranium was a waste product of the radium mining industry and was considered to have little value[70]. Uranium salts were investigated in some laboratories for their radioactive properties but essentially there was little use for this ore.

The search for uranium in the period 1942-46 has been mentioned previously in Chapter 2. In summary, Mark Oliphant visited Australia in1942 and attempted to encourage the CSIR to ensure that control of uranium ore was vested in the Commonwealth Government[71]. In September 1942 Rivett, through his Minister John Dedman, had the issue of uranium brought before the wartime Production Executive Committee[72] and consequently control of uranium-bearing ores was reserved for the Crown and a survey of these ores was commissioned[73].

The following year, the British government realised that it would need a source of uranium ore for its future defence requirements and was willing to provide funds for uranium prospecting at the two most promising Australian localities[74]. Britain, in May 1944, again made a request for uranium ore from Australia. This time the request came directly to John Curtin from Sir John Anderson (1882-1958). Sir John Anderson was the Chancellor of the Exchequer at this time. Anderson had trained as a physical chemist and had conducted research into the chemistry of uranium[75]. Britain stipulated that the need was urgent and was for the war effort[76]. The search proved to be

successful. There were promising deposits of low grade ore at both Mt Painter and Radium Hill. Arrangements were made for a guaranteed supply of Australian uranium from Radium Hill for 10 years to the Combined Development Agency (CDA), a joint UK/USA organisation[77]. The CDA had been established to ensure the supply of uranium to the signatories of the Quebec Agreement (see next section).

Small quantities of uranium ores were sent to Britain during the war years, however commercial production of uranium oxides would not commence until 1950 when an effective treatment process was finally developed for this ore[78]. At the conclusion of the Second World War Australia formalised the need for the Government to maintain control and ownership of uranium and other fissile materials in the Atomic Energy (Control of Materials) Act 1946 (discussed in Chapter 2). At this time uranium was thought to be a rare ore which must be sought out and monopolised. Britain, too, needed to secure a supply of uranium for its own energy and defence needs. Britain again sought to buy uranium from its Dominions. In Australia both the State and Federal Governments were involved in uranium exploration[79]. The Bureau of Mineral Resources, which had been established in 1946, conducted airborne prospecting in the Pilbara region of Western Australia and in the Northern Territory[80]. However, with the rudimentary techniques then available, they found nothing of economic importance[81].

It was decided, in 1947, to broaden the basis of the search and the Commonwealth Government sought the co-operation of the States[82]. Private exploration for uranium was also encouraged. In January 1948 the Chifley Government offered incentives for the private prospecting of uranium[83]. These incentives came in the form of tax-free rewards for the discovery of commercial quantities of ore deposits[84]. Substantial uranium ore deposits

were found at Rum Jungle (64 km south of Darwin) in the Northern Territory in 1949[85]. The land on which the Rum Jungle deposit was found was freehold and in 1950 the government invoked the Atomic Energy (Control of Materials) Act 1946 and took control of the area[86].

Thomas Playford (1896 - 1981), the Premier of South Australia, wanted to ensure an industrial future for his state which was dependent on the eastern states for coal supplies. Playford was the longest serving Premier in the history of Australia, serving in this position from 1938 to 1965 and later in the Opposition until his retirement 1967. Playford is best remembered for establishing Whyalla where iron ore from the deposits around the Eyre Peninsula is processed and exported, the opening of the Leigh Creek coal fields, piping water from the Murray River across to the semi-arid areas of the Eyre Peninsula as far as Ceduna, and for centralising the state's power supply[87].

Playford was aware of the uranium deposits within his own state and the possible use of these deposits in providing power in the form of atomic energy and a possible water desalination plant for his state. He was becoming impatient with the tardy progress towards atomic energy by the Commonwealth and decided to explore his options. He had already sent three engineers from the Electricity Trust of South Australia to Harwell for training, one of whom, Bob Griffiths, would later join the Commission. In 1950, Playford sought support from the Commonwealth Government and also approached the British government, early in 1951 with plans for a joint project to develop the Radium Hill deposits[88]. They turned him down since they were unwilling to negotiate with the premier of a state. Undeterred, Playford then went to visit Washington and on 21st August 1952, he met the Commissioners of the Combined Development Agency (CDA) (see next section) who were willing to

enter into negotiations for the joint development of the uranium deposits at Radium Hill[89] which also included the development of a production plant to process the ore into uranium oxide. The CDA funded the uranium oxide production plant at Port Pirie with the result that in the period 1954-62 approximately 853 tonnes of uranium oxide were produced and exported[90]. At the completion of the contract, the ore body at Radium Hill was depleted and the mine closed. The treatment plant at Port Pirie was also closed[91].

In March 1952 an agreement was reached and arrangements were made for the CDA to finance the development of the Rum Jungle mine. An agreement between the Commonwealth and Consolidated Zinc Proprietary Limited was reached for the development of the area[92]. Mining finally began in 1953[93]. Uranium was mined from three major deposits all as open-cut mines: White's cut, Dyson's Cut and Rum Jungle South[94]. The government-owned treatment plant, the first mill in Australia, began operation in 1954. In 1957 the Commission noted in its Annual Report that:

> *'at present there are two principal producers in Australia, namely Rum Jungle and Radium Hill mine with its treatment plant at Port Pirie. For some years this output is committed to the Combined Development Agency for defence purposes'*[95].

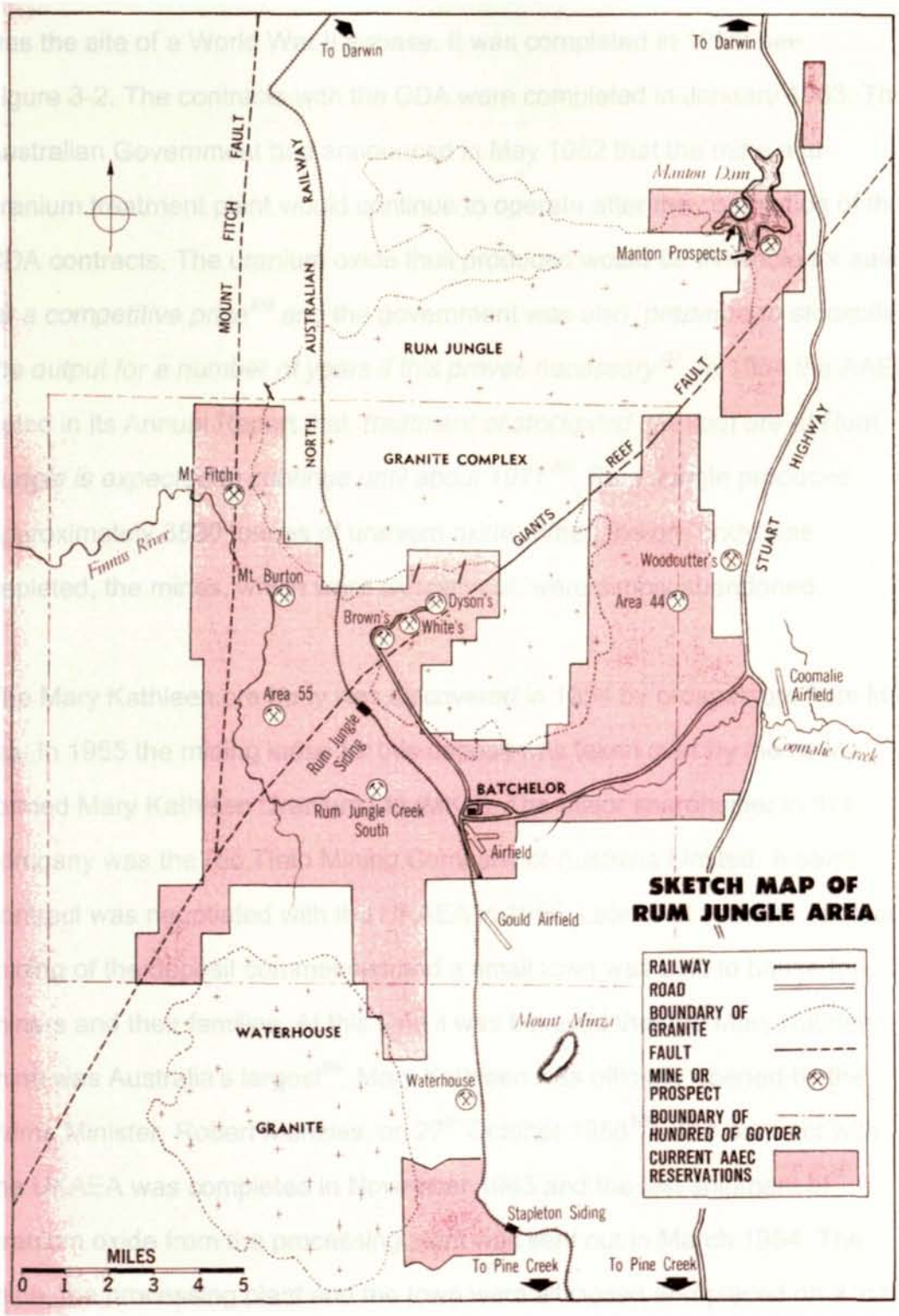

Figure 3-2 Rum Jungle

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The mines at Rum Jungle and the processing plant required a township to house the employees. The small town was built nearby at Batchelor which

was the site of a World War II airbase. It was completed in 1955, see Figure 3-2. The contracts with the CDA were completed in January 1963. The Australian Government had announced in May 1962 that the mine and uranium treatment plant would continue to operate after the completion of the CDA contracts. The uranium oxide thus produced would be available for sale '*at a competitive price*'[96] and the government was also '*prepared to stockpile the output for a number of years if this proves necessary*'[97]. In 1964 the AAEC noted in its Annual Report that '*treatment of stockpiled uranium ore at Rum Jungle is expected to continue until about 1971*'[98]. Rum Jungle produced approximately 3530 tonnes of uranium oxide. When the ore body was depleted, the mines, which were all open-cut, were simply abandoned.

The Mary Kathleen ore body was discovered in 1954 by prospectors from Mt Isa. In 1955 the mining lease for this deposit was taken over by the newly formed Mary Kathleen Uranium Ltd (MKU). The major shareholder in this company was the Rio Tinto Mining Company of Australia Limited. A sales contract was negotiated with the UKAEA in 1956. Later that year the open-cut mining of the deposit commenced and a small town was built to house the miners and their families. At this time it was believed that the Mary Kathleen mine was Australia's largest[99]. Mary Kathleen was officially opened by the Prime Minister, Robert Menzies, on 27th October 1958[100]. The contract with the UKAEA was completed in November 1963 and the last shipment of uranium oxide from the processing plant was sent out in March 1964. The mine, the processing plant and the town were all closed and placed on a '*care and maintenance basis*'[101].

The Mary Kathleen mine in this operation produced approximately 4082 tonnes of uranium oxide. Mary Kathleen would remain on a care and maintenance basis until the early 1970s when a renewed interest in uranium

would result in the mine, town and processing plant being reopened. This development will be discussed in Chapter 5.

Two companies were also operating in the South Alligator River region. United Uranium N.L. was mining the deposits located at El Sharana. South Alligator Uranium N.L. was originally working the deposits at Rockhole. United Uranium N.L. and South Alligator Uranium N.L., had reached an agreement with the UKAEA and signed a sales contract for the supply of uranium ore in August 1958[102]. The two companies operated two small mills located near their respective deposits at the Rockhole mine and at Moline in the South Alligator River area[103].

The Rockhole mine started operations in 1958 and the treatment plant was commissioned in 1959. South Alligator Uranium N.L. had completed its contract with the UKAEA in early 1962 and the mine was closed. The processing plant continued to operate until September 1962. The ore produced at the conclusion of the contract was sold on the open market and some remaining supplies were stockpiled. The processing plant was sold and dismantled. The Rockhole mine produced approximately 138 tonnes of uranium oxide[104].

The United Uranium mill at Moline continued in operation from 1959 until it completed its contract with the UKAEA in August 1964. The mill was then converted from a uranium mill into a gold mill and would continued operations[105]. The mill was finally closed in October 1965 when all the gold had been extracted from the site. The mill at Moline produced approximately 520 tonnes of uranium oxide during its period of production[106].

Uranium prospecting and later mining would come under the auspices of the Australian Atomic Energy Commission. The issues surrounding uranium mining would change with time and will be discussed in more detail later in this thesis.

3.6 Combined Development Agency

The Combined Development Agency had its first meeting in Washington on 29th January 1948. It was replacing an older organisation, the Combined Development Trust which had been reorganised and renamed[107]. The Combined Development Trust had been established as part of the Quebec Agreement in August 1943 between the United States, Britain and Canada. The Declaration of Trust from which the Combined Development Trust came into being was signed by the US and Britain.

The aim of the Trust was to '*ensure the acquisition ... of an adequate supply of uranium and thorium ores*' and to '*control ... the supplies of uranium and thorium ores*'[108]. The Trust was located in Washington DC and could '*use its best endeavours to gain control of and develop the production of the uranium and thorium supplies*' and that '*all the uranium and thorium and uranium and thorium ores and supplies and other property acquired by the Trust shall be held by it in trust for the Two Governments (ie US and Britain) jointly*'[109]. The document further notes that Britain was to approach the Commonwealth nations for the purpose of exploring, developing and securing the supply of uranium ores. In short, the Trust was established to provide a reliable source of uranium between two allied nations at a time when uranium was thought to be a rare ore. By the end of the war the Combined Development Trust controlled 97% of the world's output of uranium ore[110]. According to the terms of the Trust agreement, this output was to be equally divided between the two

signatories, although Britain had not called in her share of the uranium ore allocation.

At the conclusion of hostilities Britain decided to develop its own atomic energy plants both for civil and military uses. Relations between the two allies, began to deteriorate due to a misunderstanding concerning the sharing of information gained and developed in the Manhattan Project. The 'modus vivendi' document was signed on 7th January 1948 and effectively erased the Quebec agreement[111]. It marked the end of the confusion between the US, Britain and Canada on atomic energy and clarified the agreements of ore allocation and information exchange[112]. The US could now use all the unallocated and unprocessed British stockpile of uranium ore. The British now recognised that they would need to secure their own supplies of uranium ore and the hunt for uranium within the Commonwealth Family of Nations would begin in earnest (see Chapter 2).

The Trust was now reformed into the Combined Development Agency. The Agency would act as a separate broker in the exploration of uranium, the development of uranium mines, the production of uranium oxide and the acquisition of these. It is in this capacity that the Agency became involved in Australia's uranium mining.

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[49] Hansard 1953, 221 p 1392
[50] Hansard 1953, 221 p 1674 and p373 Moyal
[51] p373 Moyal
[52] p366 Moyal
[53] Atomic Energy Act 1953
[54] Pryor in conversation with Binnie
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[57] p30 Hardy 1999
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[61] section 20 Atomic Energy Act 1953
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[63] AAEC 1st Annual Report 1953
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[96] p18 AAEC 10th Annual Report 1962
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