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The Implications of the McMahon Act on the British Nuclear Program 1946-1958

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Abstract

This research examines the ramifications of the McMahon Act, enacted by the U.S. Congress in 1946, and its profound impact on the British nuclear program until 1958. The study focuses on exploring the fundamental factors that led to the adoption of this legislation, which significantly affected nuclear relations between the United States and the United Kingdom by restricting the exchange of nuclear information between the two nations .These constraints exacerbated tensions in bilateral relations, especially amidst the accelerating Soviet nuclear program. The U.S. administration's stringent policy in this context had negative repercussions on Britain's efforts to develop its nuclear capabilities, forcing London to confront additional challenges in enhancing the independence of its nuclear programs. In contrast, the United States sought to maintain its technological superiority and nuclear dominance. As political and economic conditions evolved, it became essential for the involved parties to pursue new understandings, culminating in the 1958 Mutual Defense Agreement, which ultimately led to the repeal of the McMahon Act. The research highlights how these political and legal dynamics influenced the trajectory of nuclear developments in both the U.S. and the U.K. It also explores how the relationship between the two countries was reshaped within the context of Cold War-related tensions.

Keywords: McMahon Act 1946 - British nuclear experience - American nuclear program - Cold War.

Introduction

Following the end of World War II, international relations entered a new phase marked by tensions and conflicts, as the superpowers emerged in the field of nuclear weapons. After the atomic bombings of Hiroshima and Nagasaki, extensive discussions arose regarding the need for nuclear weapons management and the non-proliferation of such arms. One of the most significant outcomes was the establishment of the McMahon Act in 1946, which marked a turning point in the relationship between the United States and Britain by prohibiting the exchange of nuclear information between the two nations. This highlights the importance of the research, as it provides a deeper understanding of the McMahon Act and analyzes its implications for nuclear cooperation between the United States and Britain, as well as its impact on international balances, reflecting the importance of striving for global peace.

The research problem lies in analyzing how the McMahon Act affected Britain's nuclear experience and how Britain responded to these developments. The study addresses the following questions:

1. What are the political and military factors that led to the establishment of the McMahon Act in 1946?
2. How did the McMahon Act affect nuclear cooperation between the United States and Britain in the post-war period?
3. How did the McMahon Act impact the development of nuclear programs in other countries (Britain and the Soviet Union)?

These questions will be answered within the framework of this research by following an analytical and historical methodology through the examination of diverse sources to reach historical truth; in addition to employing a comparative approach by comparing nuclear cooperation between the United States and Britain before and after the McMahon Act, to understand the international and regional effects of the law.

The research is divided into an introduction, three main sections, and a conclusion that presents the key findings. The first section focuses on nuclear relations between the United States and Britain up to 1946, while the second section discusses the McMahon Act, and the third section examines the repercussions of the McMahon Act on the British nuclear program from 1946 to 1958.

Chapter One: Nuclear Relations Between the United States and Britain Until 1946

Britain witnessed significant progress in the field of nuclear science and atomic structure since 1803(1), with a group of British physicists contributing to the enhancement of understanding of atomic particles.(2) .In December 1938, a significant scientific discovery was made concerning nuclear fission(3), as researchers demonstrated the possibility of splitting the atom, accompanied by the release of enormous amounts of energy(4).

Despite physicists' awareness of the theoretical opportunities available for building a nuclear weapon, the majority expressed in 1939 their belief in the futility of this possibility in reality, considering the atomic bomb a distant scientific myth. They argued that it would require massive efforts to construct a bomb(5).

Amid these developments, British scientists specializing in energy sought to capitalize on these discoveries, beginning to conduct experiments on uranium interactions using heavy water(6), recognizing the significance of uranium ore. Due to this awareness, the British government feared that Germany might attempt to seize the available supplies of this ore in the Belgian Congo colony, which could enable it to manufacture a weapon of mass destruction. Consequently, Britain worked to prevent Germany from accessing these resources(7).

On the other hand, the U.S. administration was concerned about Germany's trajectory towards developing unconventional weapons, especially after the famous letter sent by scientist Albert Einstein to President Franklin Roosevelt(8) on August 2, 1939. In this letter, Einstein expressed his worries regarding the possibility of Nazi

Germany developing a weapon based on the principle of nuclear fission, which prompted the United States to closely monitor nuclear research(9).

During this time, the United States sought to benefit from the advancements made by Britain in scientific research, particularly after Winston Churchill assumed the leadership of the British government in May 1940. Churchill recognized the importance of continuing research to develop unconventional weapons capable of altering the balance of power in the face of Germany, which was preparing to launch military operations against Britain(10). However, the British government faced challenges in developing its nuclear program independently, which led it to seek collaboration with the United States(11). In turn, the United States recognized Britain's superiority in nuclear research and sought to benefit from its expertise(12).

This consensus resonated within U.S. government circles, leading to increased interest in the issue of nuclear weaponry and its impact on the outcomes of the war. This matter was referred to the Office of Scientific Research and Development on June 27, 1940. After evaluating its feasibility, the U.S. administration sent a delegation of nuclear energy specialists to Britain on September 5, 1941, where they reviewed advanced British research in this field(13).

The U.S. government sought to leverage Britain's advancements in nuclear research, particularly regarding the use of uranium in the manufacture of atomic bombs(14). In turn, Britain recognized the difficulty of operating independently and the necessity of collaborating with the United States on technical matters such as verifying fundamental nuclear data and designing the atomic bomb(15).

In mid-October 1941, Vannevar Bush, the head of the Office of Scientific Research and Development, informed U.S. President Franklin D. Roosevelt about Britain's progress in their nuclear program and recommended taking advantage of it. Roosevelt expressed his support for this proposal, emphasizing the importance of communication and information exchange, as well as the possibility of establishing joint projects with Canada(16), which was interested in this matter(17).

The report issued by the American delegation after their visit to Britain on November 9, 1941, reinforced this direction, noting the potential for using nuclear energy for military purposes and the production of a uranium bomb with explosive power surpassing that of any existing weapon(18). The U.S. administration recognized the importance of monitoring Britain's progress in this field(19) and, in November 1941, an American delegation visited British nuclear research facilities(20).

On December 11, 1941, Franklin Roosevelt made a call to British Prime Minister Winston Churchill, emphasizing the importance of organized and mutual exchange between the two countries in the field of nuclear energy and the establishment of a nuclear weapons production project. Churchill welcomed this cooperation(21).

In the context of nuclear collaboration between the United Kingdom and the United States during World War II, a British delegation consisting of a group of

nuclear energy specialists traveled to the United States(22), where they met with a group of American scientists upon their arrival. The British delegation expressed its desire to secure another visit in late 1942 to continue the work and mutual nuclear collaboration. However, Vannevar Bush, one of the American officials, objected to this request, citing his involvement in negotiations with the British government regarding the exchange of nuclear information, which had not yet been resolved. This stance displeased the British delegation members, who quickly realized that the American project had gained momentum faster than expected and that the U.S. administration was determined to maintain the confidentiality of its nuclear information(23).

It appears that the United States did not disclose nuclear information to Britain during the post-World War II period, driven by its desire for superiority in the field of nuclear energy. The critical economic and research conditions in Britain hindered its progress in independent nuclear research, allowing the U.S. to take advantage of this situation.

Britain realized that the United States had made significant progress in nuclear research, leading to an widening "technological gap" between the two nations(24) while it was preoccupied with World War II. As a result, it lost its leadership position compared to the United States(25). The Roosevelt administration became aware of its advanced position in harnessing nuclear energy for unconventional weapons, making nuclear cooperation with Britain appear less important(26).

The British government expressed its desire to strengthen the nuclear partnership, but it faced restrictions in information exchange from the American side, which aimed to limit cooperation to avoid losing its superiority. This led to the integration of the nuclear programs of the two countries within the Manhattan Project in New York, with the participation of British scientists(27); however, American scientists refused to disclose valuable information to the British side(28).

On May 1, 1943, Washington effectively cut off the flow of nuclear information to Britain, which caused discontent for Churchill due to the United States' monopoly on information(29).

The U.S. government recognized that cutting its nuclear collaboration with Britain would push it to seek another partner, prompting the adoption of a policy aimed at preventing the establishment of nuclear cooperation between Britain and the Soviet Union. In contrast, Britain aimed to maintain its nuclear cooperation with Washington to develop its nuclear program and procure uranium supplies(30). These efforts culminated in the signing of the Quebec Agreement on August 19, 1943, which reclassified Britain’s role in the nuclear program to a non-central position, thereby achieving U.S. interests in reducing British influence and enhancing its own nuclear dominance(31).

In light of the above, the United States sought to achieve two main objectives through that agreement: the first was to distance Britain from the Soviet Union amid increasing cooperation between them, and the second was to gradually reduce the

partnership with Britain to ensure U.S. sovereignty in the field of nuclear energy. However, despite the existence of formal agreements, the nuclear relations between the two countries did not reach the required level of alignment(32).

On the other hand, both American President Franklin D. Roosevelt and British Prime Minister Winston Churchill signed an agreement on June 13, 1944, to secure uranium supplies(33), followed by the Hyde Park agreement on September 19, 1944, which reinforced the secrecy of nuclear information and rejected proposals to disseminate advancements made in the field(34).

After Harry Truman assumed the presidency on April 12, 1945, he relied on Roosevelt's advisors to guide nuclear policy. He formed a temporary committee on May 2, 1945, to oversee nuclear matters, and continued the policy of secrecy and monopolization(35). The use of the atomic bomb against Japan helped to bring World War II to a close in favor of the Allies, which solidified the United States' status as a nuclear power. On August 6, 1945, it was declared that the nuclear weapons project was a purely American endeavor, with no mention of Britain's role in what had been achieved(36) .

Despite American gains, discussions within the United States have revealed a division between those advocating for perpetual guardianship over nuclear weapons and those calling for the establishment of an international system to monitor nuclear energy(37). Amidst these tensions, the debate regarding how to handle nuclear information has persisted(38), with some expressing support for total secrecy while ensuring the retention of all secrets related to nuclear weapon manufacturing(39).

Based on the American perspective—that nuclear weapons are a form of private property collectively owned by the American people and licensed to American private companies solely for military purposes—a proposal was passed in the Senate calling for guardianship over nuclear energy and delegating authority for its use to the United Nations, while reaching an agreement with all nations to refrain from manufacturing nuclear weapons. In contrast, other members insisted on complete secrecy regarding all nuclear matters(40).

From the above, it is evident that the U.S. administration was preparing for a new phase in which it would define its position on allowing other countries, particularly Britain, to develop their nuclear programs. Despite announcing a shared guardianship with Britain over atomic energy, it did not clarify the exact nature of Britain's role, instead assigning Congress the task of making decisions aimed at enforcing American control over nuclear weapons and preventing other nations from possessing them, which had a significant impact on the British nuclear program.

Chapter Two: The McMahon Act of 1946

Following the end of World War II, the United States emphasized the importance of nuclear dominance and the long-term monopoly on nuclear weapons. U.S. government policy focused on maintaining national control over nuclear arms and preventing other nations from accessing nuclear technology(41).

In this context, President Harry Truman recognized the need to transfer authority from the secret military program known as the "Manhattan Project" to a civilian Atomic Energy Commission(42). On October 3, 1945, President Truman sent a special message to Congress, followed the same day by the introduction of the interim commission bill by Representative May, and subsequently to the Senate by Senator Johnson, which later became known as the May-Johnson Bill. It is noteworthy that this bill faced widespread criticism, as many considered it an attempt for military control over atomic energy in peacetime, despite its introduction being framed as a move to replace military oversight with civilian control under the War Department[(43)].

The U.S. Senate continued to debate the jurisdiction of the Committee on Atomic Energy, along with related legislative issues. This deadlock was broken in late October 1945 when a regular session was held, during which legislative leaders agreed to establish a special committee for atomic energy and granted the committee the authority to study atomic energy legislation(44).

Newly appointed Senator Brian McMahon was named the chair of this committee. During November and December 1945, the Senate committee focused on familiarizing itself with various fields of physics related to atomic energy, its production, and potential applications, as well as studying the military dimensions of the atomic bomb. Meanwhile, criticisms of the May-Johnson Bill were assessed, leading to several amendments to the proposal(45).

A study of the bill showed that the partial amendments were insufficient due to the need for multiple substantial changes. This prompted Mr. Newman, in collaboration with the author, to draft an alternative bill under the joint supervision of Senator McMahon and the administration, with support from scholars and other government agencies. As the draft was completed, the public hearing sessions of the committee were nearing their conclusion, and the final version of the draft was presented by Senator McMahon just before the Christmas holiday. Consequently, the committee agreed to consider specific legislation when the hearings resumed in January 1946, relying on both the McMahon bill and the May Johnson bill. During this period, the press was publishing daily expert testimonies contributing to public understanding of atomic energy. While the process of drafting the McMahon bill was proceeding quietly, advocates for the May Johnson bill were preparing to engage in a media campaign(46).

The provisions of the McMahon Bill focused on issues that awaited resolutions in fundamental policies: encouraging research, the government's monopoly on the production of fissile materials (the explosive substance in the bomb), and controlling nuclear materials, their production, and use, as well as conducting research that involves quantities of explosive materials and regulating the issuance of patents. The Senate committee spent four weeks listening to witnesses testifying exclusively regarding the legislation for local control over atomic energy. During these sessions, the President sent a special message to Senator McMahon outlining the administration's views on the key components of the desired legislation in the field of

atomic energy. His recommendations were aligned with the McMahon Bill, and public opinion was supportive of the McMahon Bill(47).

The Senate unanimously approved the bill on June 1, 1946, and it was sent to the President for signature. On August 1, 1946, the Atomic Energy Act of 1946 became law(48).

In the context of the issuance of the Atomic Energy Act in August 1946, which imposed strict penalties for dealing with nuclear power without international agreement, the U.S. Congress enacted the McMahon Act, which prohibited the exchange of nuclear information with other nations amid declining hopes for cooperation between the United States and Britain(49).

Naturally, this law was characterized by its relative brevity and generality, consisting of only 21 sections and two schedules. This brevity is expected, given that the law aimed to regulate a new industry that did not yet exist. The law was incorporated into the statutory books on November 6, 1946, shortly after its introduction to Congress. Some discussions related to the law suggest that the relevant science had not yet matured, necessitating that the government, represented by the minister, take on the responsibility of regulating it rather than leaving it to the open market. Under Section One, the Minister of Supply is granted extensive responsibility to promote and oversee the development of nuclear energy, while Section Two of the law complements this mission by granting the minister additional powers regarding the use, management, and disposal of nuclear energy. The general section also empowers the minister to take any actions deemed necessary for the implementation of these authorities. In general, the focus on "development" in this context is scientific rather than commercial(50).

Thus, it can be said that the United States sought, through the McMahon Act, to secure its strategic dominance in the field of nuclear energy following the end of World War II. This law was not merely a regulatory framework, but a manifestation of a comprehensive vision aimed at placing fissile materials under governmental control, thus making the McMahon Act a milestone in the history of global nuclear policy.

Chapter Three: The Implications of the McMahon Act on the British Nuclear Program (1946-1958)

In light of the enactment of the McMahon Act, Britain began to devise contingency plans for plutonium production, particularly as recent American policies were likely to adversely affect the development of its nuclear program. However, this did not deter Britain from advancing the development of its facilities and preparing plans for the establishment of a major nuclear research institution and the production of fissile materials. The British Parliament enacted the Atomic Energy Act, which granted the government extensive powers to control the use and exploitation of atomic energy(51). During the same period, the Atomic Energy Research Establishment was created, with Lord Portal(52) assuming its presidency. From the

outset of his tenure, he endeavored to maintain the confidentiality of the program to avoid any negative repercussions on relations with the United States(53).

In January 1947, the British government launched an independent weapons program under complete secrecy, despite the ongoing war and the tragic economic deterioration following the sudden collapse that accompanied the end of the war. Nevertheless, British Foreign Secretary Ernest Bevin declared in January of the same year that "we cannot tolerate the idea of accepting an American monopoly(54)."

The United States did not stop there, further complicating matters due to its monopoly on nuclear science, as well as pressure from some American leaders to end cooperation with Britain. In light of these developments, the British government increased its resolve to issue an official decision to develop its own nuclear weapon, considering it a symbol of independence. Despite the passage of the McMahon Act, cooperation in areas such as raw materials and intelligence continued(55).

On the other hand, the Soviet Union successfully detonated its first atomic device on September 19, 1949, at a time when trilateral talks were beginning regarding joint defense efforts between the United States, Britain, and Canada. Britain hoped that the Soviet test would prompt the United States to abandon the McMahon Act and resume "full cooperation in all aspects of atomic energy" with Britain. However, these talks ended abruptly following the arrest of British atomic spy Klaus Fuchs(56). In this context, Gordon Arneson, the U.S. Assistant Secretary of State for Atomic Energy, stated on February 2, 1950, that the United States was "very close to signing a new agreement with the British, but the Fuchs case negatively affected these discussions and led to their cessation(57) ."

The international situation, particularly the Korean War, contributed to Britain's successful acquisition of a nuclear bomb, as the British were concerned that the Americans might use atomic weapons in the Korean War. Moreover, the British aimed to alleviate the potential American grip on British development. Shortly after the tensions of the Cold War spread to Asia in 1950, British officials took seriously the possibility that Moscow would fulfill its commitments under the Sino-Soviet Treaty of Friendship, Alliance, and Mutual Assistance signed in February 1950. Consequently, Britain's anxiety regarding this rapprochement increased, along with fears that the fighting could spill over into Europe, especially since the Russians were taking measures in that region to ease Western pressure on China. Thus, there was a risk that the conflict in Asia could escalate into a global confrontation, potentially involving widespread nuclear use, with American air bases in Britain becoming major targets for a Soviet attack. Consequently, Britain was acutely aware of the possibility of facing Soviet retaliation(58).

On the other hand, Winston Churchill returned to power in October 1951, ambitious to renew the close relationships that had existed during the war. During his visit to Washington in January 1952, he advocated for a "reasonable share" of the nuclear knowledge acquired by the United States during the war, partially based on Britain's scientific contribution to the Manhattan Project. Despite a more sympathetic view towards Britain in the United States and the continued intelligence cooperation

to assess Soviet atomic developments, Prime Minister Churchill returned to his country without achieving the comprehensive partnership he had sought(59).

Ultimately, Britain remained in urgent need of developing its own nuclear capabilities, as it deemed this necessary for securing itself amid escalating threats, which required it to complete its nuclear program independently despite the constraints imposed by the United States.

As a result of Britain's advancements in the field of atomic research, the British detonated their first plutonium bomb in the Australian desert in August 1952. The Hurricane operation successfully detonated the first British fission bomb at 9:15 AM local time on October 3, 1952, inside the structure of HMS Plym in the Montebello Islands(60), Australia. Britain had now achieved entry-level status in the nuclear club. The British explosion in October 1952, according to Churchill's aspirations during the "Hurricane" operation, is seen as the key that could open the doors to the United States. In October 1953, the first British atomic bomb was delivered to the Royal Air Force(61) .

Following that, Eisenhower requested Congress to amend the Atomic Energy Act of 1946 to declassify scientific information and allow for the publication of research and materials, while the sale of nuclear reactors was prohibited(62). Additionally, in a conference in Washington in June 1954, President Eisenhower called for enhanced technical cooperation with U.S. allies, but he faced significant resistance from Congress and government agencies. Despite the passage of the new Atomic Energy Act in August 1954, Congress enacted a version of the Atomic Energy Act that amended the McMahon Act to permit nuclear cooperation with countries that had made significant independent progress in nuclear energy, particularly the United Kingdom(63).

In light of the foregoing, a nuclear information cooperation agreement was reached between Britain and the United States in 1955 following complex negotiations. Although this agreement was considered a positive advancement for Britain, it did not fulfill the anticipated ambitions. What is known as "Project E" led to enhanced cooperation between the Royal Air Force and the United States Air Force, as British aircraft were modified to be capable of carrying American atomic bombs. At the same time, a sensitive program called "Project X" was established with the aim of equipping the Royal Air Force to receive American hydrogen bombs. The United States Air Force was provided with detailed information and 20 bombs, with the goal of modifying British "Canberra" bombers to carry nuclear weapons. As a result, the British gained accurate information and data regarding dimensions, weights, and mounting systems, despite the efforts of the Atomic Energy Commission to prevent the leakage of this information. However, concerns arose among some officials in the British Treasury regarding the lack of additional guarantees for the continued American commitment to the agreement, as the transfer relied on an informal understanding between military leaders rather than a formal government contract. This raised worries that Britain might become dependent on American technology, potentially jeopardizing its independence in the nuclear power

domain. As a consequence of these concerns, the Treasury Department rejected funding to convert the "V" bombers to carry American nuclear weapons(64).

In light of this, Britain implemented strategic measures to develop thermonuclear weapons and enhance the production of plutonium and highly enriched uranium by constructing new reactors and expanding existing production facilities. The aim of these steps was partly to strengthen its position as a reliable ally of the United States. After Winston Churchill left office, his successor, Anthony Eden, did not exhibit the same enthusiasm for enhancing nuclear cooperation. However, President Eisenhower continued his efforts to reinforce American leadership in this area under the McMahon Act(65).

Despite the existence of the McMahon Act, approval was granted for closer nuclear cooperation that had already been discussed at the military level by U.S. President Eisenhower and British Prime Minister Macmillan at the Bermuda Conference in March 1957. Following the detonation of the first British hydrogen bomb in May 1957, the Vice Chief of Staff of the Air Force visited the United States and received assurances that Britain would be supplied with American atomic weapons. This cooperation was further stimulated by the American responses to the launch of Sputnik in October 1957. Eisenhower's administration effectively managed to circumvent the McMahon Act by amending the Atomic Energy Act of 1954 and signing bilateral agreements with Britain in July 1958[(66)].

On July 3, 1958, an agreement was signed between Britain and the United States of America aimed at using atomic energy for mutual defense purposes. The agreement was signed in Washington, where it was recognized that mutual security and defense required both countries to prepare for the consequences of nuclear wars, after both had made significant advances in the development of nuclear weapons(67).

The agreement stipulates that joint defense and security can be enhanced through the exchange of information related to nuclear energy and the transfer of relevant equipment and materials, without jeopardizing either party. Consequently, the U.S. Atomic Energy Act was amended, allowing the United States to share nuclear technology with Britain and to jointly develop nuclear weapons(68).

In the context of this cooperation, the United States provided Britain with an underwater nuclear reactor, which served as a starting point for the development of the British nuclear reactor based on American design(69). This also included the exchange of information about nuclear reactors and the British nuclear program, thereby strengthening the depth of the defense relationship between the two countries(70).

Based on the above discussion, it can be stated that the implications of the McMahon Act and the nuclear developments in the twentieth century illustrate the complex geopolitical conflict between Britain and the United States. Britain sought to achieve independence from American dominance in the realm of nuclear power, despite the pressures imposed by the McMahon Act, resulting in the establishment of new partnerships and notable successes in the development of nuclear weapons.

Moreover, the nuclear cooperation agreement signed between the two countries in 1958 represented a significant turning point, leading to enhanced defense coordination through the exchange of technology and information, as well as reflecting major transformations in the nuclear relations between the two nations.

Conclusion:

1. The understanding of the atomic structure of matter has evolved over the centuries, beginning with ancient Greek theories and culminating in modern discoveries in the twentieth century. A significant number of scientists have contributed to shaping this understanding, starting with John Dalton and his atomic theory, and extending to the discovery of neutrons and nuclear fission. The transformations that occurred in this field led to an increased interest in nuclear energy capabilities, prompting governments, such as the United States and Britain, to collaborate on nuclear weapons research during World War II. Despite the challenges, significant progress was made in this research. However, there was also an awareness of the risks associated with nuclear energy, leading to restrictions on the exchange of nuclear information, while at the same time maintaining the importance of international cooperation in this field.
2. The research indicated that the establishment of the McMahon Act was a result of increasing political and military pressures, stemming from U.S. concerns about nuclear weapons proliferation.
3. The research confirmed that the Act contributed to weakening cooperation between the United States and Britain in the fields of nuclear energy, pushing the latter to adopt an independent path in developing nuclear weapons.
4. The research showed that U.S. policy to prevent the leakage of nuclear information was a key factor in escalating tensions with the Soviet Union, as well as its impact on the nature of geopolitical conflicts in the subsequent phase.
5. The abolition of the McMahon Act coincided with the United States' legal capability to supply nuclear weapons to Britain. In this regard, the United States agreed in 1958 to provide Britain with a set of nuclear weapons, thereby opening the door to military cooperation between the two countries.

Based on the above, it can be concluded that the McMahon Act had far-reaching effects that extended beyond the relationships among the allies of the Western world, contributing to shaping the contours of international relations during the Cold War period.

Endnotes

(1) Vincenl C. Jone, United States Army In World War Ii Special Studies Manhattan: The Army And The Atomic Bomb, Center Of Milita R Y History United States Army Washing Ton, D.C, 1985, P.3

(2)Defense's Nuclear Agency 1947 – 1997 Defense Threat Reduction Agency U.S. Department Of Defenseu.Washington, D.C. 2002,P1-3.

(3)Some scholars interested in nuclear energy research recognized the serious implications of Germany's discovery of uranium fission on January 6, 1939, and the potential it offered Adolf Hitler to bolster his expansionist policies in Europe, should he manage to harness it for military purposes. This concern was particularly relevant as German scientists were at that time continuing their research at the Kaiser Wilhelm Institute on nuclear energy, with support from the Nazi government. For more information, see :

"Dhafar Muhammad Yahya Al-Barzuni, The Impact of Nuclear Armament on American Foreign Policy 1945-1963, Unpublished Master's Thesis, Dhi Qar University, College of Education for Human Sciences, 2020, p. 7; Joseph M. Siracusa, Nuclear Weapons: A Very Short Introduction, Hindawi Foundation for Education and Culture, Cairo, 2015, pp. 14-16.

(4)Margaret Gowing And Lorna Arnold., The Atomic Bomb, London, Butterworth, 1979, P. 3

(5)Ferenc Morton Szasz, British Scientists and the Manhattan Project: The Los Alamos Years, Palgrave Macmillan UK, P.2

(6)Heavy water is water that contains hydrogen atoms with an additional neutron in addition to the proton. This hydrogen isotope is known as deuterium. The chemical formula for heavy water is D2O. For more details, see: Nasri Dhiab, Geography of Energy, Al-Janadriyah Publishing and Distribution, Cairo, 2011, pp. 104-105.

(7)Gorman, Claire L., Britain And The Atomic Bomb: Maud To Nagasaki. Thesis, University Of Bradford Ethesis , 2009 , P16.

(8)Franklin Delano Roosevelt was the thirty-second President of the United States, serving from 1933 to 1945. Born in 1882 in New York, he was a member of the Democratic Party. Roosevelt won four consecutive presidential elections and played a significant role in global events during the mid-twentieth century. He passed away in 1945 in Warm Springs, Georgia. For more information, see:Odou Zwater, Presidents of the United States of America from 1789 to the Present, Dar Al-Hikmah, London, 2006, pp. 217-226.

(9)Bruno Tertri, Nuclear Weapons Between Deterrence and Danger, translated by Abdu'l-Hadi Al-Idrisi, reviewed by Farid Al-Zahi, Abu Dhabi Authority for Culture and Heritage, Abu Dhabi, 2011, p. 8.

(10)In 1940, Italy declared war against Britain and France. In the same year, Germany directed its efforts towards Britain and attempted to cut off air supply routes in order to impose a maritime blockade on the British island. However, Germany was unable to enforce a naval blockade on Britain. Instead, Germany intensified its attacks on British territory during the war. Meanwhile, Britain sought to confront the German and Italian forces head-on in the Mediterranean Basin. The British army achieved limited success in the Mediterranean; nonetheless, they failed to prevent the Axis powers from occupying the Balkan region. For more information, see: Essam Abdel Fattah, Mussolini the Tyrant Lover: Between the Dream of Empire and the Tragic End, Al-Ward Island Library, Cairo, 2010.

(11) Gowing, Britain And Atomic Energy,Op., Cit., P. 165.

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(13)Shane J. Maddock ,The Quest For American Atomic Supremacy From World War II To The Present ,University Of North Carolina Press , 2010,P.12 .

(14) Jan Christoph Laucht, German-Speaking Émigré Atomic Scientists and British Nuclear Culture, 1939-1958, the Cases of Klaus Fuchs and Rudolf Peierls. University of Liverpool, 2008,P. 74
(15)Jan Christoph Lauchtp, Op.Cit.,P. 73-74
(16)According to documents from the U.S. Department of State in a highly classified report by the Policy Planning Team, which expressed in its report the nuclear energy policy towards Canada and the United Kingdom, Canada contributed to the production of the atomic bomb and collaborated with the United States and the United Kingdom in the production of the atomic bomb. According to the terms of the Quebec Agreement signed in August 1943, the main effort was, of course, concentrated in the United States, but the British and Canadians made valuable contributions to the project, particularly in terms of scientific knowledge and talent. During this period, teams of British scientists worked in the United States on various phases of the project, including weapon development. Sir James Chadwick led the British team at Los Alamos, which—according to the Smith Report—made significant contributions to the work. For more, see:
F.R.U. S. VOL. I , National Security Affairs, Foreign Economic Policy, Policy Planning Staff Files, Report By The Policy Planning Staff, No.159, [WASHINGTON,] February 7, 1949, P.420-427.
The Joint Policy Committee was established under the Quebec Agreement to implement arrangements related to the exchange of information and the allocation of raw materials. The agreement stipulates that information shall only be exchanged in areas where parallel activities are taking place and where such exchange facilitates the acceleration of weapon production. The raw materials, which were primarily sourced from the Congo, were almost entirely allocated to the United States.
(17)Andrew J. Pierre, Nuclear Politics The British Experience With An Independent Strategic Force1939-1970 , Oxford University Press ,London ,1972,P. 63
(18)Shane J. Maddock , Op.Cit. ,P.12 .
(19)The bilateral cooperation is embodied in the law of loan and leasing; for more details, please refer to:Abdul Razak Hamza Abdullah, The American Lease and Lend Act During World War II, unpublished Master's thesis, University of Baghdad, College of Arts, 2006.
(20) Jan Christoph Lauchtp, Op.Cit.,P. 80-81.
(21)Henry D.Smyth, , Op.Cit.,P.37.
(22)The British delegation consisted of Rudolf Peierls, Wallace Akers, Franz Simon, and Hans von Halban, who conducted research on heavy water for uranium. The British proposed that Halban go to the United States to continue his work on heavy water, taking with him available quantities from Britain. However, James Conant rejected this on the grounds that the amounts of heavy water required for the reactor were far too costly compared to graphite, which could be used as a cheaper and faster medium for plutonium. This would marginalize British heavy water research. There were also security objections, as Halban was neither a British nor an American citizen. For more information, see: Gorman, Claire L., Op.Cit., P.52
(23) Jan Christoph Lauchtp, Op.Cit., P. 80-81
(24) Margaret Gowing, Op.Cit., P.38 - 40.
(25)Margaret Gowing, Independence And Deterrence: Britain And Atomic Energy, 1945–1952 Volume 1: Policy Making, Palgrave Macmillan UK,1974, P. 123.
(26)John Baylis, Anglo-American Defence Relations 1939–1980: The Special Relationship, Palgrave Macmillan UK,1981 , P. 3.
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(56)Klaus Fuchs (1911-1988) was a German physicist born in 1911. He joined the Communist Party and worked on the Manhattan Project for the development of the atomic bomb. He was arrested and convicted of espionage for the Soviet Union, serving 9 years in prison. He passed away in 1988. For more information, see: Ahmad Al-Musalamani, Modernity and Politics, Don Publishing and Distribution, 2023, pp. 26-28; Nasser bin Mohammed Zamil, Encyclopedia of Twentieth Century Events, Obekan Library, Kingdom of Saudi Arabia, 2005, Vol. 5, pp. 329-330.
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(65)John Baylis, Op. Cit., P.431
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