

GROVES, Leslie Richard. Jr. (17 Aug. 1896 - 13 July 1970), army officer, engineer, and head of the Manhattan Project during World War II, was born in Albany, New York, the third son of Leslie R. Groves, Sr., a Presbyterian minister who had recently joined the Regular Army as a Chaplain and Gwen Griffith. On his father's side he could trace his roots back seven generations to a French Huguenot immigrant who had left the Isle of Jersey in the mid-17th century, and settled in Salem, Massachusetts. His mother's roots were Welsh with her grandfather arriving in New York at the end of the 18th century.

Like many children of career military Dick, as he was known, grew up on army posts moving from station to station as his father was assigned various duties. The Chaplain was often absent from the family, serving in the Spanish-American War in Cuba, the Philippine Insurrection, and the Boxer Rebellion in China; therefore his mother had an unusually strong influence on young Dick. The family gave educational excellence the highest priority and promoted competition within a strong moral environment of right and wrong, of duty and service to God and country.

His college education included a year at the University of Washington and two years at the Massachusetts Institute of Technology before entering the US. Military Academy in June 1916. To meet the Army's need for officers during World War I, several West Point classes were accelerated and did not complete the four-year course. Groves graduated fourth in the class of November 1918 (originally the class of 1920) ten days before the Armistice, which ended the war and he chose the Corps of Engineers as his branch. With the War suddenly and unexpectedly over the Army had a large number of USMA graduates on its hands who, some senior officers believed, needed further education, especially the technical services like the Engineers. To meet this need, the graduates of the June and November 1918 Classes took special courses at the Engineer School, located at Camp A.A. Humphreys, Virginia (later Fort Belvoir), commencing in December 1918. As a part of their education they went on a ten-week European battlefield tour to France, Belgium, Germany, and Britain in the summer of 1919 to observe the engineering aspects of the military operations.

During the interwar period Groves served at Fort Benning, Georgia (1920-1921) and attended the four-month Basic Course at the Engineer School. Assignments to troop duties followed at Camp Lewis, Washington, the Presidio of San Francisco (1921-1922), and Schofield Barracks, Hawaii (1922-1925). From 1925-1927, he was engaged in civil works projects with the Corps of Engineers Galveston District. Then he returned to troop duties at Fort DuPont, Delaware (1927-1929) five months of which was spent at Fort Ethan Allen, Vermont. In October 1929 he was sent to Nicaragua as a company commander in the provisional Engineer Battalion that surveyed the proposed transoceanic canal route. In the aftermath of the devastating Managua earthquake of 31 March 1931, he was awarded the Nicaragua Medal of Merit for his "technical knowledge, spirited direction and inexhaustible energy" in leading a group of engineers that fought the ensuing fire and restored the water supply to the city.

He married Grace Wilson, daughter of a West Point graduate (class of 1877) and army officer, in February 1922 and they had one son, Richard (b.1923) and one daughter, Gwen (b. 1928).

Upon returning to the U.S. from Nicaragua he served in the Office of the Chief of Engineers in Washington, D.C., from 1931 to 1935 after which he attended the Command and General Staff School at Fort Leavenworth, Kansas. There followed two years as Assistant to the Division Engineer of the Missouri River Division at Kansas City after which he attended the Army War College in Washington, D.C. Upon graduation, he was assigned to the War Department General, Staff. On 22 July 1940 he was detailed to be special assistant to the Quartermaster General. As the nation mobilized for war Groves went on to hold several key positions that supervised hundreds of domestic Army construction projects. These included the building of camps, depots, air bases, munitions plants, hospitals, airplane plants, and the Pentagon. The peak month for Army construction was July 1942 with Groves responsible for spending \$720 million, the equivalent of about 15 Pentagons per month. His experience during the mobilization period provided unique training for dealing with the many problems he would face in the Manhattan Project. He was promoted to major in July 1940 and to colonel in November 1940, skipping lieutenant colonel.

On 17 September 1942 he was ordered to "take complete charge of the entire DSM [afterwards Manhattan] project . . . Draw up the plans for the organization, construction, operation and security of the project, and after approval, take the necessary steps to put it into effect." On 23 September he was promoted to Brigadier General and for the next three years his responsibilities expanded greatly as he oversaw the development, production, testing, deployment, and use of the atomic bomb.

Groves made almost every major decision having to do with the bomb. He chose the three main sites, Oak Ridge, Hanford and Los Alamos, selected the large corporations to design, build and operate the atomic factories based on his extensive experience working with them during the mobilization period, and, chose the key military and civilian personnel.

Groves chose Oak Ridge, Tennessee as the site for the vast uranium enrichment plants. Three methods were adopted. The Y-12 plant used the electromagnetic isotope separation process, based on the work of Ernest O. Lawrence at the University of California, Berkeley. Ground was broken on 18 February 1943 and by early 1945 the first amounts of weapon-grade uranium were shipped to Los Alamos. Groves chose Stone & Webster of Boston to design and construct the plant and the Tennessee Eastman Corporation to operate it. The complex eventually comprised some two hundred buildings spread over 825 acres with 22,500 employees. The cost to build and operate Y-12 was \$477 million, which is approximately \$10 billion in today's dollars.

The second enrichment process was the gaseous diffusion method based on research by Harold Urey of Columbia University and others. Groves formed a group to design, build, and operate what came to be known as K-25. The main building resembled a squared-off letter U. Each side was 2,450 feet long and 400 feet wide, with the entire floor space approaching that of the Pentagon. A specially created subsidiary of the M. W. Kellogg Company known as the Kellex Corporation designed the plant, the J.A. Jones Company built it and Union Carbide & Carbon Corporation operated it, at a total cost of \$512 million, which is approximately \$10.7 billion in today's dollars.

The third method, liquid thermal diffusion, was only adopted after it was recognized that integrating the three processes could result in attaining higher enrichment levels. Work got underway on the S-50 plant in early July 1944 and by October the first product was drawn. Groves chose the H.K. Ferguson Company to build and operate the plant. By the spring of 1945 the slightly enriched uranium that emerged from S-50 was used as feed for K-25, which in turn was used in Y-12. The final product, some 64 kilograms, enriched to an average of over 80 percent of the isotope U-235, was used in the Little Boy bomb that was dropped on Hiroshima.

Groves chose Hanford in southeast Washington State as the site to build the plutonium production reactors and related facilities and recruited the E.I. Du Pont de Nemours Company to design, construct, and operate it. Three water-cooled reactors were built on the south bank of the Columbia River. Nearby three massive chemical separation plants were built to extract the plutonium from the irradiated fuel. By mid-1945 enough plutonium had been produced for the device detonated on 16 July 1945 at the Trinity site in New Mexico and for the bomb that was dropped on Nagasaki. The cost to build and operate Hanford was \$390 million or \$8.2 billion in today's dollars.

Groves' challenge was to make kilogram amounts of bomb-grade uranium and plutonium on an industrial scale when up until then only specks had been produced in university laboratories. The technical challenges were enormous and the time pressure crucial as it was believed that Germany was probably working on an atomic bomb.

The third major site that Groves chose was Los Alamos, New Mexico where a laboratory was established in the spring of 1943 to research, develop, produce and test the bomb, under the leadership of Robert Oppenheimer.

Groves' most important relationship with a scientist was the one with Oppenheimer. Against the advice of almost everyone Groves chose the thirty-eight-year-old theoretical physicist to head the laboratory at Los Alamos. It turned out to be an inspired choice as Oppenheimer displayed leadership qualities that Groves apparently saw early on, when others did not. Among Oppenheimer's attributes was an ability to grasp the essentials of a problem quickly and to listen to conflicting opinions and then to synthesize them in such a way that the different points of view melded together, making everyone feel they had shared in the solution.

Though different in many ways Groves and Oppenheimer worked extremely well together primarily because each saw in the other the skills and intelligence necessary to fulfill their common goal, the successful use of the atomic bomb in World War II. Part of Groves' genius was to entwine other people's ambitions with his own and for these two ambitious men they each saw the bomb as their route to immortality.

With a few exceptions Groves got on well with the Manhattan scientists. At the outset he knew little about nuclear physics and the complex technologies involved but he did his homework and relied upon James B. Conant and Richard Tolman, his formal scientific advisers, as well as some of the best scientists in the world. Eight on the project had already won a Nobel Prize, including Enrico Fermi, Niels Bohr and Arthur H. Compton, and more than a dozen others

would do so after the war. Managing the ever-present tension between the culture of the military and that of science was a constant challenge for Groves.

Groves was obsessed with maintaining the secrecy of the project and preventing espionage and as the project accelerated he oversaw a vast security, intelligence, and counterintelligence operation. For him the heart of security was the compartmentalization of knowledge, i.e., each man should know everything he needed to know to do his job and nothing else. As a testament to the policy's success most of the tens of thousands of Manhattan Project workers did not know that they were working on. The public at large, all but a few Congressmen and Senators, and the Executive branch, except for one or two Cabinet members, were also kept in the dark. It was the "best kept secret of the war." But the practice was not foolproof. After the war it was discovered that there were several spies in the project who had passed important information to the Soviet Union probably accelerating their atomic bomb program by a year or two. The most famous spy cases that have come to light concern Klaus Fuchs, Julius and Ethel Rosenberg, and Theodore Hall, with several others still to be discovered.

Groves played a central role in determining which targets to hit in Japan. In effect he became the operational commander of the bomber unit he had brought into being to drop the bombs, and was intimately involved in the planning and timing of the attacks. Rather incredibly the process of selecting the targets and carrying out the atomic missions when on outside of the channels of the Joint Chiefs of Staff and the War Department's Operations Division. In April 1945 Groves convened a Target Committee and set the targets chosen should be places that would most adversely affect the will of the Japanese people to continue the war. According to Groves and his superiors the effect of attacking a city without warning would "shock" the Japanese into surrender. Second, the target should be military in nature, though in the course of the war the Americans had (as had the British and Germans before them) gradually crossed a line, ceasing to distinguish clearly between what was military and what was civilian. Third, the target should not have been previously damaged and of such size so as to better assess the bomb's effects and its power. Lastly, Groves felt that at least two bombs were going to be necessary, with the second dropped as quickly as possible after the first, to force the end to the war. The reasoning was that the first bomb was necessary to show what it could do, and the second would convince them that the United States could produce bombs in quantity. Faced with the prospect of even more bombings the Japanese would have an excuse to surrender.

Over the next month the Target Committee analyzed weather conditions, the best height to detonate the bomb, and other details and proposed a list of target cities. After changes were made in June and July, Hiroshima, Kokura, Niigata, and Nagasaki constituted the final target list. Groves wanted to include the ancient city of Kyoto but Secretary of War Henry L. Stimson overruled that choice; one of the few times the general did not get his way. The first bombing mission was carried out over Hiroshima on August 6 resulting in 70,000 deaths and injuring an equal number. Three days later a second bomb was dropped on Nagasaki killing 40,000 and injuring 60,000 more. On August 14 Japan surrendered ending the war.

Immediately after the war, as the United States grappled with the complex issues and implications of this new super weapon. Groves found himself in the middle of a contentious debate over whether military or civilian officials were going to be in charge of atomic energy.

The Atomic Energy Act of 1946 called for the creation of the civilian Atomic Energy Commission and the transfer to it of all of the MED's property. Groves' position as head of the MED ended on 31 December 1946 after which he became Chief of the Armed Forces Special Weapons Project. The AFSWP was primarily concerned with developing military expertise in storing, transporting, maintaining and assembling the bomb. Groves retired from the army at the end of February 1948 and took an executive position with Remington Rand in Connecticut. Upon his sixty-fifth birthday in 1961 he retired and three years later moved back to Washington, where he died. He is buried in Arlington Cemetery.

The role of science and the scientists is often over emphasized in accounts of the Manhattan Project while the engineering, industrial, and military aspects are neglected. New perspectives are gained by understanding Groves's central role in building and using the atomic bomb during World War II. He believed that the bomb, if completed in time, might help end the war and save American lives and he had no moral qualms, then or later about dropping it on the enemy. Using his formidable administrative skills Groves coordinated the vast resources of the American government, military, industry and universities to achieve success in a little over 1,000 days and by those actions has left a deep imprint on the decades that followed.

Bibliography

Groves' personal papers are in Record Group 200 at the National Archives & Records Administration (NARA) in College Park, Maryland. Also at NARA are the Manhattan Engineer District records, part of RG 77, the Records of the Chief of the Office of the Chief of Engineers. A selection of documents that were of special interest to General Groves from RG 77 has been placed on five rolls of microfilm (NARA MI109) for easier access. Groves oversaw the writing and editing of the massive *Manhattan District History*, later placed on 14 rolls of microfilm (NARA A1218). Groves's own account is *Now It Can Be Told* (1962). The literature about the Manhattan Project is extensive and includes some excellent official histories and a range of scholarly works. In the former category are Richard C. Hewlett and Oscar E. Anderson, Jr., *The New World 1939/1946* (1962), Vincent C. Jones, *Manhattan: The Army and the Atomic Bomb* (1985) and the British history by Margaret Cowing, *Britain and Atomic Energy 1939-1946* (1964). In the latter category is a comprehensive biography by Robert S. Norris, *Racing for the Bomb* (2002), and overviews by Stephane Groueff, *Manhattan Project* (1967) and Richard Rhodes, *The Making of the Atomic Bomb* (1986). An obituary appears in the *New York Times*, 15 July 1970.

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