The Manhattan Project: The Project To Create The First Atomic Bomb Essay, Research Paper

Early Atomic Science

The theory that atoms make up all matter in the universe can be dated back as far as 500 BC in ancient Greece. It was not until the time of Sir Isaac Newton, 1665, that Newton came up with a theory that all atoms were made up of three subatomic particles: protons, electrons, and neutrons. What Newton could not figure out was how the three parts were kept together. With this piece of vital information a mystery, Newton s theory would lead to the conclusion that an atom cannot keep it self together, and was unstable, and this could not be because it was very apparent that atoms did indeed hold together.

The answer to Newton s dilemma would not be answered until centuries later, in 1922, by a young Danish physicist, Niels Bohr. He developed a theory from the work of Albert Einstein and Max Planck. Bohr used quantum theory to explain the apparent paradox. His development of the atomic model earned him a Nobel Prize in physics in 1922.

There was still speculation in the physical science community about the energy required to hold an atom together. One theory came 17 years earlier from the world famous Albert Einstein who developed the equation: energy equals mass times the speed of light, squared. This equation stated that was nothing more than frozen energy. If this equation was true, if the energy in one ounce of matter was released, the result would

be an explosion with the power of millions of tons of TNT.

Most scientists blew off the idea that matter could be converted into energy. Even Einstein himself was skeptical of the idea that it could be done. A theoretical physicist, Leo Szilard, was engrossed in the idea that it could be done. Leo Szilard was a Hungarian Jew who was educated and lived in Berlin until 1933. He fled to England to flee the rising Nazi party who encouraged anti-Semitism and religious persecution. The story had become common among many European scientists at the time. By 1939 almost 100 European scientists fled to America in fear of Nazi Germany. In England, Szilard devoted his work to discovering the power within the atom and how to release it.

In 1939, Szilard had discovered an experiment that proved a chain reaction to penetrate an atom s nucleus was possible. Szilard reasoned that only a neutron, a subatomic particle with no charge, could be used to penetrate the nucleus. But a neutron, with no charge, could go through the electrons, and protons.

A group of physicists, Enrico Fermi, Otto Hahn and Fritz Strassman conducted an experiment in which the scientist bombarded the most unstable element known, Uranium, with neutrons. The result was the first atom ever split. The nucleus of the atom was split into two new and different elements. Lise Meitner and Otto Frisch showed that at the same

time that the atom split, a tremendous amount of energy was released. Frisch gave it the name fission (fission is the Latin word meaning to split).

Scientists all over the world rushed to study the fission process. This new discovery had Szilard worried about the possibility of a chain reaction large enough to create mass destruction. At the same time he and others realized that the energy harnessed by fission could be a massive boon to humanity. With new global political turmoil originating from the hateful Nazi Germany, what if the ultra-nationalist supremacist leaders of the Nazi party in Germany were to hold this power? The result would almost certainly be catastrophic to humanity. (Schwinger, Julian, Blow, Michael)

The Coming Storm

After the largest war the world had ever seen, The Great War (known today as World War One), Germany was left in pieces. The economy had been brought down to a state lower than any other German economy before it. The German people had massive depression, not only in it s economy, but in the spirit of its people. The German people were a defeated people. The entire world was going through an economic depression.

After the war, an organization was created called The League of Nations. Similar to the United Nations, it was setup to ensure that a

major war such as World War One would never happen again. The League of

Nations and its members had signed treaties to downsize their armed forces. By the beginning of 1939 the United States of America had an Army smaller than Rumania. The U.S. Navy was almost 80% dismantled. Despite the Leagues efforts to create treaties to prevent aggressive Nations like Germany and Italy from forming armies, they failed to take direct control of these nations to prevent them from regaining the power they once held. There were limits on the amount of arms these countries could manufacture and build up, and the kind of arms they used. By the time it was obvious that they (especially Germany) had openly and definitely disobeyed their agreements, they had more arms than most of Europe combined, so the world couldn t do anything without initiating aggression.

In August of 1939, Leo Sizzled, Eugene Winner, and Edward Teller, all agreed that they must warn the President of the United States, Franklin Roosevelt, about the dangers of a possible atomic weapon falling into Germany s hands. They also had to warn him that Germany s leader, Adolf Hitler, had cut off uranium supplies from Czechoslovakia to have all the uranium produced shipped to Germany s war laboratories. But there was no way to get word to the president. The three found their answer in Albert Einstein. He was the most famous scientist in the world, Albert

Einstein was a household name. Roosevelt would certainly respond to a letter from Albert Einstein. Szilard, Winger, and Teller all met with Einstein in his home in Long Island, New York. They wrote a letter to Roosevelt and had Albert Einstein sign it. The letter was then given to the friend of Roosevelt, Alexander Sachs.

Sachs met with the president on October 11th. Only one month before, Germany had broken an agreement with England and France and had invaded Poland. The president was extremely enthusiastic to help in any way he could to have the scientists start a program to create an atomic weapon before Germany. (Blow, Michael)

The Manhattan Project

In November of 1939, President Roosevelt set up a committee on uranium (the Uranium Committee). The President put Lyman Briggs, an army scientist, in charge of the Uranium Committee. In the first meeting of the Uranium Committee, Briggs had the three European scientists who helped draft the letter to Roosevelt attend. The results of the meeting were requests to the President to provide more money toward atomic weapons research. The president was too busy dealing with the crisis in Europe to bother with the Uranium Committee. As result, the total amount of money allocated for atomic weapons research by the end of 1940 was only $50,000. The events that happened in the following year would

change everything.

On December 7, 1941 after months of tension between the two countries, Japan had sneak-attacked the U.S. Navy port of Pearl Harbor, Hawaii. The following day, President Roosevelt declared a state of war between the U.S. and Japan. Later the next year Germany declared war on the United States, now the situation was critical and the danger was clear.

The project to create an atomic bomb was brought to an unused squash court under a college football stadium in Chicago. An atomic pile was constructed and was ready to test only seventeen days after it s initial construction. Led by Fermi, the scientists at the stadium witnessed the first self-sustaining nuclear chain reaction. This began the development stage of the project. The self-sustaining chain reaction was the central process of an atomic bomb. After this success, the head of the project, Vannevar Bush got the consent of President Roosevelt to place the project under the jurisdiction of the Army Corps of Engineers. James C. Marshall was made responsible of the building of the facilities in which the bomb was to be developed in. Marshall s office was in Manhattan, near Columbia University. The code name of the project was- Manhattan Engineer District. The project would later be known as the Manhattan Project. Even after the changes in the project, it was not coming along

fast, this would change in the fall of 1942. In the fall of 1942, General Leslie R. Grooves of the Army Corps of Engineers would be placed as the officer in charge of the project. After the first few weeks under Grooves, the project went ahead at an amazing speed. He had cut through bureaucracy and had given the project priority status in the requisition of supplies and funds. After Grooves took over, the construction of three facilities across the country began: Oak Ridge, Tennessee, for the production of the bomb fuel, uranium-235; Hanford, Washington, for production of the plutonium fuel; and Los Alamos, New Mexico for the bomb s production and assembly.

In August of 1943, President Roosevelt and Prime Minister Winston Churchill agreed to make the project a cooperative venture. The British had been working on the production of the bomb for some while at that point. It was mutually agreed, that the scientists working under the British would all join the scientists at Los Alamos to continue their work. A theoretical physicist named J. Robert Oppenheimer was put in charge of the creation of he first bomb at Los Alamos.

With the new scientists arriving at the Los Alamos facility, Grooves stepped up security. All letters between scientists outside of Los Alamos

had to be in code or, at times, in Chinese. The streets of Los Alamos had no signs or names, so anyone who was from the outside could not become

familiar with the facilitates. Grooves was not concerned about infiltration of secrets by Japanese and German spies as much as he was concerned about Soviet infiltration. It was well known within the top military and political brass that there was going to be competition for control of most of Europe, and a key factor in the possible negotiations would be possession of the atomic bomb. Little did Grooves know, one of the trusted scientists, Klaus Fuchs, was divulging vital information to the Soviets.

The first idea for the design of a Uranium based atomic bomb was a gun type mechanism. This device would shoot a uranium bullet onto a suitable fissionable material, therefore creating critical mass and releasing the atomic energy. This idea led to the design of the bomb later named Little Boy that was eventually detonated over Hiroshima. The scientists who created Little Boy were so confident of the idea of the gun mechanism creating critical mass and releasing the atomic energy, that it was never tested before it was dropped.

The plan for the plutonium bomb was the idea of implosion. This would require a plutonium core to be crushed inward until it reached critical mass. This was much more complex than the idea of the gun mechanism. The final design for the plan was to create a plutonium core and have several explosive devices around the plutonium, they then all had

to be detonated at the exact same time to crush the plutonium. This was the idea of the bomb known as Fat Man which was eventually dropped on Nagasaki.

On April 12, 1945 President Franklin Roosevelt died of a stroke, while posing for a portrait. His Vice President, Harry S Truman became the thirty-third President of the United States. Truman knew nothing of the Manhattan Project, or of the 2 billion dollars invested in the project to create the first atomic bomb.

By April 30, 1945 the German leader, Aldof Hitler, committed suicide. Russian troops were already inside Berlin. The war in Europe was almost over. Germany surrendered unconditionally on May 6, 1945. Germany was no longer a threat. The United States then turned all its attention to the Pacific.

In the Pacific war, Japan had become desperate. They had sent out the order to their soldiers to fight to the death. The use of kamikazes was ordered. These were pilots who flew planes loaded with explosives directly into American ships, killing the pilot and inflicting great damage on ships. But the most shocking of sacrifice occurred on the islands of Iwo Jima and. On Iwo Jima, Americans died by the thousands trying to root out Japanese who had dug themselves in to tunnels and caves. On Okinawa, the Japanese military command sent out the order to fight until

every last soldier was killed. Even civilians killed themselves before they

were captured. The civilians were told not to trust the American marines when they said that they wouldn t harm them. They were told that the only way that Americans could become marines was to kill their own parents. Okinawain civilians jumped of jagged cliffs to their deaths, rather than be captured by the enemy. Japan s intent was for the American public to be so outraged by the heavy American casualties, that President Truman would be forced to negotiate a peace that would leave Japan much like they were before the war.

Truman, Churchill, and Stalin had a conference in Potsdam, Germany, to decide the future of Europe and the ongoing war in Europe. Russia had mutually agreed with the United States to help defeat Japan in the Pacific. Stalin told Churchill and Truman that within a few months the Russian army would set off for Siberia and capture parts of northern Asia that were under Japanese control.

Early in the morning on July 16, 1945, the first atomic bomb ever detonated was exploded over the New Mexico desert. The test was nicknamed Trinity . The bomb was a plutonium device using the implosion method of detonation. The bomb was called, the Gadget . President Truman got word of the successful test the some day at Potsdam. Truman was clearly excited about the news and showed it at the

Potsdam conference. He became quite bold when negotiating the terms by which Europe would be divided up between England, Russia and the United

States. He informed Stalin that the United States had possessed a new weapon of unusual destructive force. At Potsdam, all three leaders had agreed to inform Japan that if they did not accept the allied request for a complete and unconditional surrender, they would suffer prompt and utter destruction. Japan s Prime Minister Baron Kantaro Suzuki responded to the warning by vowing to resolutely fight for the successful conclusion of the war.

On July 24 Truman officially released the bomb to the Air Force for use against Japan. The bomb was to be delivered on August 3 and used on August 6, had Japan not yet surrendered. Early, at 7:30 A.M., over Hiroshima in the plane holding Little Boy (the Engola Gay), the bomb was armed. At 8:16 A.M. Little Boy detonated 1900 feet over Hiroshima. Buildings and people near ground zero were completely vaporized by the million degree heat. People as far as 7 miles away, were blinded by the light. After the blast a fire storm started, thus oxygen was sparse in the area, thousands died of asphyxiation. This was the same effect of the conventional fire bombing over Tokyo, days earlier. Glass windows over 12 miles away were broken by a shock wave created by the blast. The destruction was unlike anything the world has seen before.

President Truman demanded that Japan surrender. The Air Force dropped leaflets over major Japanese cities calling for the people of Japan to petition the Emperor to end the war before another Hiroshima occurred. Three days later President Truman approved the use of a second atomic bomb. Around 11 A.M. on August 9, an Air Force plane dropped this bomb called Fat Man , over the city of Nagasaki. It s original target was the city of Kokura, but it was to cloudy to get an effective sight of the target.

More bombs were prepared, but Truman stopped the production. He said he couldn t kill all of those kids . It did not matter. Emperor Hirohito accepted the Potsdam Declaration, and made a radio address to his people and told them that he could not bear seeing his people suffer any more. (Beyer, Don E., Larsen, Rebecca)

The Decision

The decision to drop the atomic bomb over Japan was a controversial one. And in Harry Truman s own words, The hardest decision anyone has ever had to made. The most common question asked What if it had not been dropped? . In all likelihood, the result was a planned invasion of Japan. The Pentagon estimated the casualties of the planned invasion of Japan at 1,000,000.

A month before the Trinity test, the U.S. Air Force fire bombed the

Japanese capital of Tokyo using gelatin gasoline. The result of one single day of this kind of bombing was 100,000 deaths and 100,000 injuries. This number is almost the total amount of deaths that resulted from the Atomic explosions over Hiroshima and Nagasaki. It was the shock and horror that Hiroshima and Nagasaki were destroyed in seconds by one single bomb flew in by one single plane, that convinced Emperor Hirohito to order an unconditional surrender of Japan and it s armed forces.

Over 150,00 prisoners of war were being held in Japan. The Japanese military command sent out an order to all P.O.W. camps just weeks before Hiroshima, “If the American dogs invade, every prisoner in all the camps will be killed. Not a single bullet is to be used, they are all to be beheaded.”

The Japanese atrocities during the war, the possible deaths of hundreds of thousands of Allied soldiers in a proposed invasion, the thousands of casualties taken in the battle of Okinawa and Iwo Jima, the thousands of Navy sailors killed by the sneak attack on Pearl Harbor, all contributed to the decision to drop the first atomic bomb.