Celebrating the 60th anniversary of the Los Alamos National Laboratory

Commentary by Achim Seifter, Los Alamos National Laboratory

In 1938, nuclear fission was accomplished by German scientist Otto Hahn. As a result of his success many physicists immediately realized the enormous energy stored in the atomic nucleus, and the potential this energy had if it were to be applied to weapons. As it became evident that Germany was collecting all the uranium that was available during World War II, Leo Szilard together with Edward Teller, both outstanding physicists of Hungarian origin, urged Albert Einstein to write his famous letter to U.S. President Roosevelt to warn him about the dangerous situation which Adolph Hitler would present if Hitler possessed nuclear weapons. Roosevelt took Einstein's letter to heart and embarked on exploring the feasibility of such an "atomic weapon." He put J. R. Oppenheimer, then a leading expert in nuclear physics and a professor at UC Berkeley, in charge of the so-called Manhattan Engineering Project. Together with the military leader of this project, General Leslie R. Groves, Oppenheimer decided to locate the main facility of this project in Los Alamos in the mountains of northern New Mexico. Hence, the Los Alamos National Laboratory was born in April 1943.

Oppenheimer recruited the best-and-brightest minds available, including Hans Bethe, Enrico Fermi, Richard Feynman, Leo Szilard, Eugene Wigner and Edward Teller just to name a few. After two years of intense work, the $2 billion dollar top-secret project's outcome was the first atomic bomb which was successfully tested at the Trinity test site in southern New Mexico on July 16th, 1945.

In the meantime, Germany capitulated and lost the war on the European front, but the war was still in motion in the Pacific Theatre with no end in sight. A multitude of reasons existed in support of ending the war there as fast as possible: to save the lives of U.S. soldiers fighting Japan, to prevent the Soviet Union from expanding their influence in the Far East, etc… President Roosevelt's successor, Truman, decided after much deliberation to drop the first atomic bomb over Hiroshima, Japan. The bomb was a uranium-powered, gun-type bomb nicknamed "Little Boy."

On August 6th 1945, approximately 140,000 inhabitants of Hiroshima were killed while thousands more were severely injured in a city that was laid to waste. Japan's refusal to surrender resulted in a second bomb, a plutonium-powered, implosion-type bomb nicknamed "Fat Man," being dropped on August 9th, 1945 over Nagasaki. Another 70,000 people were killed.

The decision to drop two bombs over Hiroshima and Nagasaki finally effected Japan's surrender. World War II was officially over, but another war began: the armament race between the U.S. and the Soviet Union known as the "Cold War." Just four years after the first successful U.S. nuclear test at Trinity, the Soviet Union exploded their first nuclear device on August 29th, 1949 at their test site. The "Cold War" was fought under the imminent threat of nuclear disaster. Again, Los Alamos scientists were urged to develop better and more powerful nuclear weapons.

When the Soviet Union collapsed in the early 1990s, the Cold War ended, but there were other challenges to the scientific community. For example, how was it possible to control the proliferation of nuclear weapons, and how could the use of nuclear weapons by terrorists or dictatorial regimes be prevented? Now, one of the great challenges is how to guarantee the effectiveness of the nuclear weapons stockpile without being allowed to perform live nuclear tests. This challenge, in particular, is mitigated by running computer simulations of the behavior of nuclear weapons. To do this properly, outstanding computer hard- and software needs to be developed and improved. Only then can the necessary material data be

effectively measured. These developments and measurements will take a significant amount of time before they come to full fruition. As work continues, it is necessary to consider other projects tackled by the Los Alamos National Laboratory in the last 60 years.

The Los Alamos National Laboratory has not been idle, and it does not only stand for big contributions to modern weapons technology. Many other scientific achievements have been made including the development of nuclear rocket propulsion systems as well as the ability to generate short, powerful light pulses by excimer lasers. Another main effort was (and still is) to explore alternative sources of energy like geothermal-, solar- and nuclear fusion energies. Geological studies to predict earthquakes and computer models to understand the Earth's climate change have been performed and developed. When the LANSCE linear particle accelerator was built in 1972, the results of this facility did much to contribute to 'particle physics' ever since.

Other major contributions to science have been made by various Los Alamos scientists. For example, the first experimental proof of the existence of the "neutrino" was delivered in Los Alamos by Fred Reines. He was awarded the 1995 Nobel Prize in Physics for his work in this matter. From the beginning, Los Alamos scientists including J. von Neuman and R. Feynman, later followed by Stan Ulam and Nick Metropolis, led the way in developing computers and performing computations of complex mathematical problems. Other scientific disciplines besides physics and mathematics, such as biology and medicine, have been explored. The best example that illustrates Los Alamos' broad scientific identity is the human genome project which was recently completed. It was largely conceived in 1986 in Santa Fe by Los Alamos scientists. Since then, the human genome project came to signify the dedication of the Lab to modern science.

These days, systems and techniques to detect explosives, nuclear, biological, and chemical hazardous materials are being developed in Los Alamos in support of the Department of Homeland Security. The intent is to prevent further terrorist attacks like that of September 11th, a day which will never be forgotten.

Today almost 14,000 people, including contractors from all over the world, are working at, or in conjucntion with, the Los Alamos National Laboratory. With an annual budget of approximately $2 billion dollars to support the Los Alamos population and its facilities, modern science can be assured of its progress through an intense and consistent effort. When of the 60th anniversary celebrations commenced on April 7th, 2003, this effort was best summarized by interim director Pete Nanos: "Science is the value the Laboratory brings to the nation."

The author would like to thank Dr. Konstantinos Boboridis and Dr. Andrew Obst for their helpful comments in reading this article.

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