ATOMS FOR PEACE + 50
Nuclear Energy & Science for the 21st Century

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Welcoming Remarks

MARBURGER: Thank you. Being the first speaker gives me a broad scope to discuss today's topic and I will take advantage of it. Today's conference marks a singular event in the long history of the relationship between science and society and I appreciate the opportunity to help to celebrate it. I recall visiting a technical exhibit with my father associated with the "Atoms for Peace" initiative here in Washington, D.C. in the mid- 1950s.

There was free literature available, as there always is at such things, and I took much of it home and devoured it. And later that year I made a little wooden model of a cyclotron based on what I had learned from the literature. I made it for a ninth grade science project. The Atoms for Peace Initiative had the same impact on me that the Apollo Project did a decade afterward for many other future scientists. We were caught up in the excitement of discovering new things about nature and using them to benefit all humankind.

Discovering and benefiting: these are the two sides of the coin of science that scientists tend to perceive, a win-win situation for society. All too often, however, in our enthusiasm for new knowledge and new applications, we fail to consider the possibility of applications, or the side effects of applications, that are not beneficial. Non-scientists viewing science often see two sides of a different but sadly more familiar coin, knowledge used for good or knowledge used for evil.

Nuclear knowledge began as many fields of science do with accidental discoveries made possible by new technology. As our instruments become more powerful, we notice more about how nature works and more possibilities open up to us for even more technology. Rutherford discovered the nucleus to his surprise in 1911 and nuclear physics proper began, not immediately thereafter, but in the two decades between what was then called the War to End All Wars, that began a few years after Rutherford's discovery, and the war after that one that ended, at least in Asia, with the bomb.

Much has been written about those decades, the brightest, in my opinion in all the history of science and the very darkest in the modern history of Europe. The first facts of nuclear behavior emerged in a society that had been rendered unstable in the aftermath of war, and susceptible to disruption by a tiny band of the pathologically resentful led by Adolph Hitler. Chadwick discovered the neutron in 1932.

In 1933, the year that Hitler became chancellor of Germany, Rutherford said, "Anyone who looked for a source of power in the transformation of atoms was talking moonshine." Immediately after reading Rutherford's quote in The London Times, Leo Szilard conceived the idea of the neutron chain reaction. Fission itself was not discovered until much later, late in 1938, the year of the Anschluss. Neils Bohr brought news of it to the U.S. in January 1939, two months before Czechoslovakia disappeared from the map of Europe.

In that year, more that 100 scientific papers were published on nuclear fission, among them the important liquid drop theory of Bohr and Wheeler, which explained in some detail how nuclei could split apart. These papers were published despite efforts by some physicists, most of them from Europe, including Szilard, to voluntarily withhold publication, given fission's possible military implications. That autumn, Einstein's famous warning letter reached President Roosevelt.

Early the following year, 1940, (and this is interesting) a committee of the National Research Council formed to control publication of papers with potential military application in all American Journals. According to the official report by Henry Smythe, "the procedure followed was to have the editors of various journals send copies of papers in this field in cases where the advisability of publication was in doubt" to the NRC Committee, which would then advise the editors of the conclusions of its membership, "This arrangement was very successful in preventing publication…It is of interest to note," said Smythe, "that this whole arrangement was a purely voluntary one; the scientists of the country are to be congratulated on their complete cooperation."

Nuclear physics entered the world in a time of war, and its phenomena were first exploited for military purposes. Today's symposium celebrates the deliberate and most remarkable attempt by President Eisenhower to turn the coin of science to its other face, and begin a worldwide effort to use the knowledge gained at great expense and sacrifice to benefit mankind. Eisenhower's rightly famous address to the United Nations General Assembly in December 1953 was not the first move toward beneficial applications of nuclear phenomena. General Wesley Groves had launched a similar such effort in 1944. But it was by far the most dramatic, and its effects were lasting, as others in this conference will surely tell.

Today we look back on these events from a vastly different world. The wartime science accelerated a development that spun out from the profound scientific discoveries in the first quarter of the 20th century. Technologies that have their origins in quantum based understanding of the micro world have transformed our way of life, increased the numbers of our years and brought new capabilities within reach of ordinary men and women everywhere. What is more, the plain evidence of the fruitfulness of science has changed our attitude toward the reasons

society should support it. It is not primarily for war but for improving the quality of life, for economic strength and, yes, for the sheer pride and joy of discovery.

Unfortunately, the coin always has two sides. In this new century we are again witnessing the emergence of a new science in a new domain revealed to us by new technology. It could be called the new science of life, new because for the first time the deepest structures of life's physical foundations are revealed to us. The early history of this science was entirely benign. It emerged on the bright side of the coin. But the very knowledge that empowers us to heal can also be exploited to do us harm. It is a great and bitter irony that the most humane endeavors to defeat the organisms that invade our bodies and cause them to dysfunction can also be turned into diabolical instruments of human destruction. One of our greatest fears in this era of world encircling terrorism is the fear of being attacked from within our own bodies by chemicals or organisms spawned or strengthened by bio-science.

I do not underestimate the danger that remains from nuclear destructiveness nor the long path yet to tread to capture nuclear phenomena for human good. We still have heaps of potent weapons and poisonous by-products of their manufacture, and we have a lingering suspicion of things nuclear, and I much regret, we have a lingering suspicion of each other.

We've surely come a long way along a path illuminated 50 years ago. President Bush's decision to follow Secretary Abraham's recommendation to recommence our nation's role in the International Fusion Program, ITER, is but one example. This administration's interest in new and safer fission reactors is another. But the lessons of the wartime birth of nuclear science, of the deliberate efforts to protect its secrets from the enemy and then to turn the huge investment toward beneficial applications are very broad and speak clearly to us today.

In some ways the case of bioscience is the reverse of nuclear science. It was born into a healthy atmosphere and its evil usages were exploited later. No one needs to be convinced that bioscience heals. Its benefits are so obviously great, that any effort to conceal discoveries in this field to inhibit bio-terrorism must be undertaken with great care, less the remedy cost more than the disease.

Nor are we dealing with a Hitler, despite the presence on the stage of world affairs of some very unsavory characters. But bio-terrorism does not need a Hitler to succeed in staggering a strong nation. The anthrax incidents two years ago this month took far fewer victims than the atrocities at the World Trade Center and the Pentagon, but they could have taken more. And their impact on the conduct of government was profound.

The Atoms for Peace Initiative drew the world's attention to the benefits of nuclear power. Today we struggle to expose and meet the challenge of the dark side of bioscience. In neither case is success conceivable without the full cooperation of the scientific community. In both cases the scientific community has given that cooperation in ways that are appropriate to the occasion.

Earlier this month in an action strikingly reminiscent of the events of 1940, a committee of the National Research Council, chaired by MIT's Gerald Fink, released a report with

recommendations for the control of publication of experiments that might enhance the efforts of bio-terrorists. The report sets forth criteria that would trigger a process of review, and calls for the involvement of the Department of Health and Human Services. No single action by the scientific community could have provided more assurance to the public or established greater credibility for science on this perplexing issue.

The Atoms for Peace Initiative assumes that the implications for society of scientific knowledge can be influenced by deliberate public action. What began as a policy idea turned into a powerful world movement that continues to this day. Of all the lessons of that troubled time of war and international tension, this may be the most promising that a choice does exist, that knowledge of the physical world, combined with leadership and determination and effort can make the world a better place.

I appreciate being able to say these words this morning at the beginning of this important conference. Thank you.

[applause]