1319

Hello, Mikhail

A Paper Presented to the Sphex Club of Lynchburg, Virginia
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By Dr. Thomas C. Tiller, Jr.

[See the biographical sketch on the following page.]

As requested, here's some bio info for your use, Graham. (Use as little of as you choose.)

Tom Tiller is a native North Carolinian and a long-time resident of Lynchburg.

B.A. Lynchburg College
M.Ed. University of Virginia
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He served in the U.S. Army for two years.

He is long-time supporter of quality public education in Lynchburg.
Served three terms on the School Board, followed by service on a Citizens Task Group to develop career ladder opportunities for outstanding teachers, and later served on the LCS Drug-free Schools Advisory Committee. Presently a member of the Lynchburg City Schools Education Foundation Board.
Also served three terms on the Lynchburg Planning Commission

He retired in May 2007 after nearly fifty years of faculty and administrative work at LC.

Tom and his wife of 51 years, Mary Frances, have two sons, Thomas and Craig,
And two grandsons, Shea and Jacob.

Thomas C. Tiller

Hello, Mikhail

For the SPHEX Club October 9, 2008, by Thomas C. Tiller

Nuclear matters have been much in the news again in recent years. Currently, unstable North Korea has a nuclear weapons program in suspension, Iran, growing in power in the Mid-east, has many of the necessary ingredients for production of nuclear weapons and an unstable leader in Venezuela claims the right to nuclear development.

The world has now lived with the existence of nuclear weapons for more than sixty years and has yet to solve many of the problems associated with them. In this paper I will briefly sketch some of the history of U.S. involvement under the eleven presidents who have served during the nuclear era. Though time available tonight will permit the citing of only a selected few of the many significant episodes, I hope to capture the flavor of the challenges presented by such awesome weapons.

Additionally, statements of current U.S. presidential candidates about nuclear weapons will be presented. Finally, the paper briefly will consider the costs of nuclear armaments and the present state of policy concerning proliferation, reduction of nuclear arsenals and related matters.

The idea of a nuclear bomb

After 1905, when Albert Einstein described the vast energy stored in atoms as E=MC 2, a series of discoveries and formulations contributed toward unlocking that energy. Leo Szilard, in 1933, had an insight about how it might be possible to set up a chain reaction to release such energy, showing a path to producing a nuclear bomb. He and others confirmed this in lab experiments in the late 1930s. U.S. English and Russian scientists knew that the Germans were working

on an atomic bomb and believed it crucial that the allies opposing Hitler develop it first. Richard Rhodes's book, The Making of the Atomic Bomb, provides in detail the amazing story of the science and technology – the theory and application – involved in this undertaking.

FDR

In the late 1930s Szilard consulted Edward Teller and other physicists to carefully craft a letter to President Franklin Roosevelt, to be from Einstein, to urge government support for scientists working on the matter. To deliver the letter to FDR, they called upon a friend , economist Alexander Sachs, who had a prior relationship with the President. In 1939, Sachs delivered Einstein's letter and Szilard's cover letter and presented his own summation of the potential of nuclear fusion. He emphasized three points concerning potential applications of nuclear energy: power production, medical use and "bombs of hitherto unenvisaged [sic] potency and scope," in that order. (Rhodes, Making, p.315)

Roosevelt saw reason enough to instruct his aide to follow up, with eventual full approval for what later became the Manhattan project. Congress, from 1941-45 appropriated more than two and a half billion dollars for nuclear development. The funding was done through disguised appropriations and expenditures without Congress having much knowledge of what it was for.

HST

The project was nearing fruition when Roosevelt died and Vice President Harry S Truman became president, without prior knowledge of the bomb. A few days after being

sworn in, Truman was informed of it by Henry Stimson and briefed in detail by Vannevar Bush. [Bush was the Sphex Club annual meeting speaker May 1, 1968; his topic was on youth and education.] It is ironic that Vice President Truman had been kept in the dark about the secret A-bomb project because, when he as a senator headed the Senate Special Committee to Investigate the National Defense Program, he once initiated an inquiry into the secret operations spending huge amounts of money. Truman eventually backed off that investigation, but otherwise his Committee was credited with saving the U.S. many millions of dollars by findings leading to elimination of waste and fraud in many other projects.

Worried in the spring of 1945 that scientists were being excluded from policy making as the availability of an atomic bomb was becoming a reality, Leo Szilard, again sought to deliver a letter to the president. Truman deflected Szilard to James Byrnes, who was soon to become Secretary of State. "[Szilard's letter] was a prescient document. It argued that in preparing to test and then use atomic bombs the United States was 'moving along a road leading to the destruction of the strong position [the nation] hitherto occupied in the world. .... U. S. military strength was essentially due to the fact that the United States could outproduce every other country in heavy armaments.' When other countries acquired nuclear weapons, as they would 'in just a few years,' the advantage would be lost: 'Perhaps the greatest immediate danger which faces us is the probability that our *demonstration* of atomic bombs will precipitate a race in the production of these devices between the United States and Russia.' " (Rhodes, Making, pp. 636-637) Szilard

went on to plead that only the small group of scientists actively engaged in nuclear work were able to evaluate the situation.

In spite of such arguments, a decision was not so much made, as a predetermined trajectory of events was followed, to go ahead with use the atomic bomb on Japan. The result of an endeavor of several years length, two and one-half to three billion dollars spent, involving the labor of 100,000 persons, and seen as a way to save American lives and hasten the end of the war, was almost certain to be used. A committee to study implications, led by Stimson, comprising scientists and government officials, recommended that the bomb be used against the enemy as soon as possible. However, files opened in 1961 showed that petitions addressed to Truman, signed by many other scientists who had worked on development of the bomb, and against use of the bomb without prior warning, were not delivered by General Groves to Truman. (Fogelman, Hiroshima, pp. 63-67)

Truman was at a Big Three meeting in Potsdam with Winston Churchill and Joseph Stalin when he received news of the success of the A-bomb test in New Mexico, on July 16, 1945. The President informed members of his top staff with him at Potsdam and casually mentioned to Stalin that "we had a new weapon of unusual destructive power." (Mccullough, Truman). [Stalin already knew form information supplied by a traitor, Klaus Fuchs.)

Regardless of any reservations that might have existed, the decision was taken by U. S. strategists to also go ahead with planning for a land invasion of Japan, with estimates of U.S. casualties in the range of 200,000 dead or injured.

On August 6, on the journey home from Potsdam, Truman received a message from Stimson, "Big bomb dropped on Hiroshima August 5 at 7:15 a.m. Washington time [August 6 at 8:15 a.m. Japanese time]. First reports indicate complete success which was even more conspicuous than earlier test." This was the 9,000 pound "Little Boy," a fission uranium gun bomb, released from 31,000 feet by bombardier Thomas Ferebee, from a B-29 plane, "Enola Gay," piloted by Paul Tibbets. The target was the easily recognizable T-shaped Aioi bridge. The bomb exploded at 1890 feet above Hiroshima and killed an estimated 80,000 people. The following day Harold Baldwin opined in the New York Times, "Yesterday, we clinched victory in the Pacific, but we sowed the whirlwind." John Hersey's Hiroshima and Michihiko Hachiya's Hiroshima Diary provide vivid details of conditions after the Hiroshima bombing.

On the morning that the first A-bomb was dropped, Setsuko Nakamura and her eighth-grade class mates reported to assigned duties in Hiroshima. Most were sent out on streets to clear fire lanes in keeping with a plan to minimize damage from expected fire bombing. Those on the streets were obliterated by the bomb, but Setsuko had been given a different assignment. She arrived at 8:00 a.m. for her first day at the 2nd Army headquarters, assigned to be an assistant decoder. When the bomb exploded at 8:15 a.m., she saw a bluish-white light and felt her body floating before the building collapsed over her, resulting in injury (radiation sickness, internal bleeding, some loss of hair) but sparing her life. She lost a sister and eight extended family members. Setsuko says of the experience, "Your world disappeared: family members, friends, the physical city."

After junior college in Japan Setsuko attended and graduated from Lynchburg College. She made educating people about the dangers of nuclear weapons and advocating for a peaceful world her lifetime work. This, and other work she did to assist Japanese families in Toronto, led to her induction in 2007 into the Order of Canada, a high honor that nation bestows on its most outstanding citizens.

When Japanese surrender did not follow by August 9, a plutonium bomb called "Fat Man" was dropped on Nagasaki.

When Senator Richard Russell urged the President to continue to rain destruction on Japan, Truman replied, "For myself I certainly regret the necessity of wiping out whole populations because of the 'pigheadedness' of the leaders … and for your information, I am not going to do it unless it is absolutely necessary. It is my opinion that after the Russians enter into the war the Japanese will very shortly fold up. My object is to save as many American lives as possible but I also have a human feeling for the women and children of Japan." (Truman, p. 458)

In July and August of 1945, many military leaders in Japan were holding out for fighting to the death. Other Japanese officials were trying to go through the Soviets to sue for conditional surrender. On August 2, 1945, an intercepted communication from Tokyo to a Japanese diplomat to Russia said, "The battle situation has become acute. There are only a few days left in which to make arrangements to end the war…. Since the loss of one day relative to this matter may result in a thousand years of regret, it is requested that you immediately have a talk with Molotov." (Fogelman, Hiroshima, p.38) The

Soviets not only spurned Japanese entreaties for assistance in getting better surrender terms but also declared war on Japan on August 8, i.e., after Hiroshima and before Nagasaki. On August 11, two days after the Nagasaki bombing, the Japanese surrendered.

Surrender was followed by much sentiment in favor of international control of nuclear know-how, weapons, and materials to safeguard the future of Earth (e.g. see Saturday Review, October, 1945). Appendix C provides a City historian's account of the reaction in Lynchburg to the A-bomb.

Truman issued a joint statement with Clement Attlee of Great Britain and MacKenzie King of Canada calling for international control of nuclear weapons, leading to creation of the United Nations' Atomic Energy Commission, and in 1946 offered the Baruch Plan for abolition of nuclear weapons.

But the cold war arms race was on and in 1949, after a strong debate lasting months among his advisors, Truman approved a project to develop the thermo-nuclear hydrogen bomb. In a final meeting to review options, his only question to his advisors was, "Can the Russians do it?" When all assented, he said, "In that case, we have no choice. We'll go ahead." This is an early, clear and powerful example of how the U.S. and the Soviets kept reaching for ways to maintain or gain the upper hand in nuclear weapons for half a century. During this era Joseph McCarty's witch-hunt tactics concerning possible communists in US government helped fuel the cold war, which in turn helped spur the nuclear arms race.

IKE

The Dwight D. Eisenhower administration's 1953 assessment of security concluded that the Soviet arsenal could inflict serious damage on the U. S. A later report said that nuclear war, whether by Soviet first strike or not, would bring the country to "practically total economic collapse" for at least six months and would require care for two-thirds of the population, with limited medical facilities. Given that outlook, Eisenhower moved over a period of several years to the conclusion that the U. S. arsenal had only one sane role – to deter the Soviets from using their nuclear weapons. (Ascendency, 138). The doctrine became known as Mutually Assured Destruction or MAD. In the mid to late 1950s, Gallop polls showed that a large percentage of the public believed there was much danger of world war and expected that atomic or hydrogen bombs would be used. Bomb shelters were much in the public mind. (Osgood, Total Cold War) Early in Eisenhower's administration, policy and planning included use of nuclear weapons. (Eisenhower Diary, Document # 592)

Early policy also embraced tactical use of "battlefield" (short-range) nuclear armed weapons, such as Honest John rockets. [This policy was of particular interest to me because I served in an air-transportable battalion within the Army missile command trained for use of such weapons.] Later, U.S. policy moved away from the notion that a country could make tactical use of nuclear weapons without risking escalation to a full-scale nuclear exchange.

There was a huge increase in the number of U.S. nuclear weapons during Eisenhower's presidency, but by the late 1950's he sought to slow the expansion of the U.S. arsenal

because he knew from U-2 reconnaissance not to believe Kruschev's claims about Soviet ballistic missile capacity.

Throughout the nuclear weapons era, worries have extended beyond intentional use by a nation to include accidental or maverick use by an individual. For example, during Eisenhower's presidency, Curtis LeMay, head of the Strategic Air Command, in a 1957 exchange about readiness said, "If I see that the Russians are amassing their planes for an alert, I'm going to knock the shit out of them before they take off the ground." When reminded "But General Lemay, that's not national policy." Lemay responded, "I don't care. It's my policy. That's what I'm going to do." (Kaplan, Wizards…., Chapter 6)

JFK

Even though the U.S. had great superiority in nuclear weapons during the 1960 presidential election campaign, John Kennedy had used the alleged missile gap as a campaign issue. So, upon taking office he ramped up U.S. military spending even though by then he knew there was no gap. (Ascendancy, 139)

After the Bay of Pigs fiasco, Kennedy worried that Kruschev thought him spineless. When Kruschev sent missiles to Cuba, Kennedy's first reaction was "He can't do that to me." (High Noon, 75), an example of how the egos of leaders can be a factor in presidential decision making. The matter escalated into "the world's only superpower nuclear confrontation." "[Members of the Joint Chiefs of Staff pushed for action]." "General Curtis LeMay … barked at Kennedy that his blockade of Cuba is 'almost as bad as the appeasement at Munich." (Dobbs, One Minute to Midnight)

In spite of pressures from their militaries for action and delays in getting messages back and forth, both Kennedy and Kruschev kept control of events. After the two leaders

compromised out of the confrontation in Cuba, they agreed to implement a hot line to enhance communication in future.

Still later, after Kennedy in 1963 declared a unilateral moratorium on nuclear testing in the atmosphere, he and Kruschev agreed to end above ground nuclear testing.

LBJ

In 1968 the administration of Lyndon Johnson worked out with the Soviets an international non-proliferation treaty to (attempt to) stop the spread of nuclear weapons. The non-proliferation treaty pointed toward the elimination of all nuclear weapons, providing that states that did not have them by 1967 agreed not to obtain them, and that states that possessed them agreed to divest themselves of these weapons over time. In exchange non-nuclear signatory states would have access to nuclear technology and material for peaceful purposes, at low cost. This treaty and arrangements built to implement it are still core elements of international nuclear control efforts.

Nixon

From 1969 forward, Richard Nixon pursued a policy of détente with the Soviet Union. He repudiated the former policy of nuclear superiority, replacing it with one of nuclear sufficiency, and gave up the idea of winning a nuclear war. In military planning, Nixon substituted a policy of one and a half war sufficiency in place of the two and a half war sufficiency that previously had been U.S. policy.

In 1972 Nixon and Leonid Brezhnev agreed to Strategic Arms Limitation (SALT I), limiting the number of U.S. and Soviet nuclear weapons and delivery systems. They also agreed to the antiballistic missile (ABM) treaty. (Ascendency, 2007).

Ford

found evidence that North Korea might have diverted plutonium from its civilian nuclear program. A crisis was temporarily averted by diplomacy resulting in aid of various types to North Korea. Clinton also took the lead in gaining an indefinite extension of the Non-Proliferation Treaty, otherwise set to expire in 1995 and in completing negotiation of the multinational Comprehensive Test Ban Treaty, but the Republican senate rejected ratification of the latter. (Goodby, Borderline)

Bush II

In the early months after he became president, George W. Bush and Dick Cheney through a series of speeches and meetings indicated that this administration was moving toward unilateral withdrawal from the nearly thirty year old ABM treaty. Also, after the terrorist attacks on the U. S. on 11 September 2001, Bush, in a reversal of previous American non-proliferation policy based on diplomacy and incentives, proposed to stop proliferation of nuclear weapons through unilateral, preventive use of force. In December, 2001, over the objection of Russia, Bush gave notice (as permitted by the treaty) of unilateral U.S. withdrawal. (The Seventh Decade, 103)

Current state of nuclear weapons world wide

Obviously, there are major nuclear weapons issues yet to be solved by the international community of nations.

Signaling renewed concern about the dangers of nuclear weapons, a bi-partisan group comprising George P. Shultz, William J. Perry, Henry A. Kissinger and Sam Nunn published an Op Ed piece titled "A World Free of Nuclear Weapons" in The Wall Street Journal (January 4, 2007) The essay outlined dangers posed by proliferation of nuclear

weapons worldwide and endorsed the goal of a world free of nuclear weapons – which they characterized as the vision of Reagan and Gorbachev. The writers presented an agenda of urgently needed action addressing: deployment, reduction in stockpiles, eliminating short-range missiles, security of weapons and materials, arrangements for fuel for nuclear power reactors, halting production of fissile material globally, and resolving regional confrontations that give rise to new nuclear powers. This group of Shultz and other signatories again pressed the case for a world free of nuclear weapons in another WSJ article on January 15, 2008.

An ominous announcement from Moscow in December 2007 (between the dates of the WJS op ed essays) underscored worries about renewal of the arms race: Russia's First Deputy Prime Minister Sergei Ivanov, said his country must achieve parity in nuclear potential with the United States "to just stay independent." "The weak are not loved and they are not heard, they are insulted, and when we have parity they will talk to us in a different way." He continued with a story suitable for a "Saturday Night Live" skit, "That same Donald Rumsfeld, who spent his childhood in Chicago, which is famous for its mobsters, told me, 'They listen better to your arguments if you don't just smile, but carry a gun in your bosom.' " In separate statements, Vladimir Putin has spoken of the possibility of a 40 percent increase in Russian military spending.

As mentioned earlier, in the Nuclear Non-Proliferation Treaty the original signers – the U.S., the Soviet Union, Great Britain, France and China – agreed that in time they would eliminate their nuclear weapons. In exchange, by committing not to pursue nuclear weapons, non-possessor countries that signed the agreement would get nuclear power

technology and material at low cost, not including R&D costs. In his speech at our annual meeting last May, Chuck Robb referred to security concerns related to this tradeoff. This is problematic because the technology and material they get for nuclear power generation may put them just a step or two from what they need for nuclear weapons production. Israel (intentionally unconfirmed by Israel and certain of its neighboring governments), India, South Africa (obtained in the 1980s, dismantled in the 1990s), Pakistan and North Korea developed nuclear weapons outside of the NNPT guidelines.

In spite of considerable reduction in certain categories, the "haves" certainly have not come anywhere close to eliminating their nuclear weapons; in fact it is known that the U.S., Great Britain, Russia and probably others are upgrading and modernizing their nuclear arsenals. According to tracking by the Arms Control Association, nuclear armed states now possess from fourteen to fifteen thousand operational nuclear weapons, with the U.S. and Russia accounting for all but approximately one thousand of them. Another eleven to thirteen thousand combined are stockpiled by the U.S. and Russia.

For those and other reasons, certain of the "have-nots" keep edging closer to obtaining nuclear weapons, expanding risks of intentional or accidental use.

As scientists knew in the 1940s would become the case, nuclear weapons know-how exists and is not limited to "Haves," or even to governments.

Some pending issues: How and when, as agreed in the nuclear non-proliferation treaty, will the signers who have nuclear weapons give them up? How can the promised expertise and material for peaceful uses of nuclear power safely be provided to the non-nuclear weapon signers? How will non-government entities such as terrorist

organizations and rogue scientists be controlled? How will nuclear power facilities be safeguarded so they are not turned into nuclear disasters by attacks on them using either nuclear or conventional weapons? How can radioactive waste from nuclear weapons and nuclear power production be safely stored?

McCain/ Obama

In his book Borderline of Armageddon, James E. Goodby writes, "Presidents have many powers in the American system of government , but none is more consequential than their responsibilities regarding nuclear weapons. The choices they make can change the course of human history and affect the lives of billions of people. ...American presidents have carried this burden as trustees not only of the American people but ... as trustees for civilization." "...[But] presidents are not free agents: laws and customs, circumstances within and outside the U.S., political, military and technical advisers, and the influence of Congress and public opinion have to be considered." U.S. citizens ought to be concerned about the nuclear policy ideas of the candidates for the presidency of our country.

In a May 27, 2008 speech at the University of Denver, Republican John McCain laid out several aspects of his intended nuclear policy. His speech included, "A quarter of a century ago, President Ronald Reagan declared, 'Our dream is to see the day when nuclear weapons will be banished from the face of the earth." That is my dream, too. "Russia and the United States are no longer mortal enemies. As our two countries possess the overwhelming majority of the world's nuclear weapons, we have a special responsibility to reduce their number. ...we should reduce our forces to the lowest level we judge necessary, and we should be prepared to enter into a new arms agreement with Russia reflecting the nuclear reductions I will seek." He also promised to strengthen the

Non-Proliferation Treaty and proposed increased financing for the International Atomic Energy Agency and requiring that undisclosed transfers of sensitive nuclear technology from one country to another be deemed "illicit and subject to interdiction." "We should also begin a dialogue with China on strategic nuclear issues. The goal would be to encourage China to conform to the practices of the other four nuclear powers recognized by the Non-Proliferation Treaty, including working toward nuclear arsenal reductions and toward a moratorium on the production of additional fissile material."

In May, 2005, Barack Obama spoke in the U.S. Senate "to instill a sense of urgency" about strengthening non-proliferation policies and practices. Then in an October, 2007, speech at DePaul University on national security, he included the following statements concerning nuclear weapons. "Make no mistake: we must always be prepared to use force to protect America. But the best way to keep America safe is not to threaten terrorists with nuclear weapons. – it's to keep weapons and nuclear materials away from terrorists. That's why I've worked with Republican senator Dick Lugar to pass a law accelerating our pursuit of loose nuclear materials. And that's why I'll lead a global effort to secure all loose nuclear materials during my first term in office. But we need to do much more. … More nuclear weapons and more nuclear-armed nations mean more danger for us all. Here's what I'll say as president: America seeks a world in which there are no nuclear weapons."

"We will not pursue unilateral disarmament. As long as nuclear weapons exist, we'll retain a strong nuclear deterrent. But we'll keep our commitment under the Nuclear Non-

Proliferation Treaty on the long road towards eliminating nuclear weapons. We'll work with Russia to take U.S. and Russian ballistic missiles off hair-trigger alert, and to dramatically reduce the stockpiles of our nuclear weapons and material. We'll start by seeking a global ban on the production of fissile material for weapons. And we'll set a goal to expand the U.S. –Russian ban on intermediate-range missiles so that the agreement is global."

"When I'm president, we'll strengthen the NN-P Treaty so that nations that don't comply will automatically face strong international sanctions."

Conclusion

As the next section is presented, bear in mind that according to a Brookings Institution study released in 1998 – the most comprehensive attempt to audit the costs nuclear weapons programs – from 1940 to 1998 the U.S. spent 5.8 trillion (expressed as 1996 dollars) on nuclear arms.

In a speech before the American Society of Newspaper Editors shortly after taking office in 1953, President Eisenhower rhetorically posed a compelling question. He began by offering examples of the possible, and as it turned out for both the US and the Soviet Union – though more disastrously for the Soviets, the eventual costs of the cold war arms race. "The best would be this: a life of perpetual fear and tension; a burden of arms draining the wealth and labor of all peoples; a wasting of strength that defies the American system or the Soviet system or any system to achieve true abundance and

happiness for the peoples of the earth. Every gun that is made, every warship launched, every rocket fired signifies … a theft from those who hunger and are not fed, those who are cold and not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children.

The cost of one modern heavy bomber is this: a modern brick school in more than 30 cities. It is two electric power plants, each serving a town of 60,000 population. It is two fine, fully equipped hospitals. It is some 50 miles of concrete highway. We pay for a single fighter plane with a half million bushels of wheat. We pay for a single destroyer with new homes that could have housed more than 8,000 people. …. [This is a moment] that calls upon the governments of the world … to answer the question that stirs the hearts of all sane men: is there no other way the world may live?" (Lynchburg College Symposium Readings, pp.624 and 634.)

The answer to Eisenhower's question, "Is there no other way the world may live?," is still a challenge for all of us. Mikhail Gorbachev, on the verge of selection to head the USSR, made a statement that could have been the practical answer of his failing country and its deprived people: "We can't go on living like this." (Gorbachev, Memoirs, p. 165). When nuclear weapons historian, Richard Rhodes, in his 2007 book, Arsenals of Folly, did what amounted to holding up a mirror half a century later to Eisenhower's 1953 speech and his 1961 farewell warning about the military-industrial complex, he saw, "Far from victory in the Cold War, the superpower nuclear arms race and the corresponding militarization of the American economy gave us ramshackle cities, broken bridges, failing schools, entrenched poverty, impeded life expectancy, and a menacing and secretive national-security state."

Maybe we have to turn to song and poetry for more hopeful answers: Bob Dylan suggested, "The answer is blowing in the wind." Carl Sandburg wrote in his long poem, The People, Yes, of his belief in the ability of the people to prevail over obstacles, "You can't hinder a great wind from blowing. Time is a great teacher. You can't live without hope." Perhaps in some future time, the people will rise up as in a verse from Dilys Bennett Laing's poem, "Not One Atoll," in which she casts the scientists as frivolous in their Nuclear experiments and accords those who can conceive earth's "domestic order" as deserving to speak with authority.

"This is the earth, / my domicile, in whose domestic order /

I have a voice, small but authoritative. /

This is my father's and mother's home. / Do it no harm. I love it. It is mine./

I charge you not for any frivolous reason / of curiosity or greed or fear /

To scar it anywhere. Do not hurt one island, / no not the littlest atoll, in the name /

Of science or security." (Brunner, pp. 189-190)

Thomas C. Tiller

Bibliography

Brinkley, Douglas, The Reagan Diaries (New York: HarperCollins Publisher, 2007).

Brunner, Edward, Cold War Poetry (Urbana: University of Illinois Press, 2001).

Committee for the Compilation of Materials on Damage Caused by the Atomic Bombs in Hiroshima and Nagasaki, Editor, Hiroshima and Nagasaki (New York: Basic Books, Inc., 1981).

Dobbs, Michael, One Minute to Midnight (New York: Alfred A. Knopf, 2008).

Fitzgerald, Frances, Way Out There in the Blue: Reagan, Star Wars and the End of the Cold War (New York: Simon &Schuster, 2000).

Frankel, Max, High Noon in the Cold War: Kennedy, Krushchev, and the Cuban Missile Crisis (New York: Ballantine Books, 2004.

Fogleman, Edwin, Hiroshima: The Decision To Use The A-Bomb (New York: Charles Scribner's Sons, 1964).

Gaddis, John Lewis, The Cold War A New History (New York: The Penquin Press, 2005).

Goodby, James E., Borderline of Armageddon (Lanham, MD.: Rowman & Littlefield Publishers, Inc., 2006).

Hachiya, Michihiko, Hiroshima Diary (Chapel Hill: The University of North Carolina Press, 1955).

Hersey, John, Hiroshima (New York: Milestone Editions, 1946).

Hunt, Michael H., The American Ascendancy: How the United States Gained and Wielded Global Power (Chapel Hill: The University of North Carolina Press, 2007).

Kaplan, Fred, The Wizards of Armageddon (New York: Simon and Schuster, 1983).

Kaplan, Fred, Daydream Believers: How a Few Grand Ideas Wrecked American Power (Hoboken, N.J.: John Wiley and Sons, Inc., 2008).

Kurzman, Dan, Day of the Bomb (New York: McGraw-Hill Book Company, 1986).

Leftler, Melvyn P., For the Soul of Mankind (New York: Hill and Wang, 2007).

Lifton, Robet Jay, Death in Life: Survivors of Hiroshima (New York: Random House, 1967).

Lifton, Robert Jay and Mitchell, Greg, Hiroshima in America: Fifty Years of Denial (New York: G.P. Putnam's Sons, 1995).

Matlock, Jack F., Jr., Reagan and Gorbachev: How the Cold War Ended (New York: Random House, 2004).

Mccullough, David, Truman (New York: Simon & Schuster, 1992).

Phillips, Kevin, American Theocracy (New York: Penquin Books, 2006).

Presidential Papers of Truman and Eisenhower.

Rhodes, Richard, Arsenals of Folly: The Making of the Nuclear Arms Race (New York: Alfred A. Knopf, 2007).

Rhodes, The Making of the Atomic Bomb (New York: Simon & Schuster, 1986).

Rhodes, Dark Sun: The Making of the Hydrogen Bomb (New York: Simon & Schuster, 1995).

Saturday Review Letters and editorials, October 13, 1945, etc.

Schell, Jonathan, The Seventh Decade (New York: Henry Holt and Company, 2007).

Schrecker, Ellen, Editor, Cold War Triumphalism: The Misuse of History After the Fall of Communism (New York: The New Press, 2004).

Schwartz, Stephen I., Ed., Atomic Audit: The Costs and Consequences of U.S. Nuclear Weapons Since 1940 (Brookings Institution Press, 1998).

Scruggs, Philip Lightfoot, The History of Lynchburg, Virginia 1786-1946 (Lynchburg, Virginia: J.P. Bell Co. Inc., undated).

Shultz, George, Turmoil and Triumph: My Years as Secretary of State (New York: Scribner's, 1993).

Shultz, et. al., "A World Free of Nuclear Weapons," Wall Street Journal, 1-04-2007.

Shultz, et. al., "Toward a Nuclear-Free World," Wall Street Journal , 1-15-2008.

Thurlow, Setsuko N., Phone conversation, 2007.

Truman, Margaret, Harry S. Truman (New York: William Morrow & Company, 1973).

Wyden, Peter, Day One Before Hiroshima and After (New York: Simon and Schuster, 1984).

Blue

Appendix A: *First 30 years of **U.S.-Soviet Arms Race***

*Adapted from Hunt, The American Ascendancy....

Weapon/Event	United States	Soviet Union
Atomic Bomb	1945	1949 (copy of U.S.'s)
Men under arms (early 1948)	(U.S.&G.B., 2.8 m.)	2.9m. (Well below contemporary estimates)
First intercontinental bombers	1948	1955
Nuclear warheads (1949)	200	Soviet's first test
Decision to build H Bomb	1950	?
Jet bombers	1951	1954
H Bomb tested	1952	1953-55
(H Bomb 700 times more destructive than the Hiroshima A Bomb)		
ICBM s	1958	1957 note
Warheads (1960)	7,000	400
Satellite photo reconnaissance	1960	1962
Reliable solid fuel ICBM s	1962	1966
Cuban Missile Crisis	October, 1962	
Kennedy-Khrushchev hotline	1963	
Ban of nuclear tests in atmosphere	1963	
Strategic nuclear warheads	12,233	2,443
ABM defense system	1974	1966 note

Green

Appendix B: *Proliferation of Nuclear Weapons*

1945 – U.S.

1949 – Soviet Union

1953 - Great Briton

1964 - France and China

Late 1960's (intentionally unconfirmed) - Israel

1974 – India

1980's South Africa; dismantled in 1990's

1998 – Pakistan

2007 – North Korea

Appendix C: The City And The Bomb

Philip L. Scruggs included the following in his The History of Lynchburg Virginia 1786-1946, pp. 331-2 "One day the editor of one of the local newspapers was asked … to have lunch with a visiting English scientist …. He was doing war work at a place called Oak Ridge, Tenn. …. No one had had the slightest idea of what he was doing at Oak Ridge except that it was something to do with important research. Years later he was to be awarded a Nobel Prize in Chemistry. His name was Harry G. Emaleus, Ph.D. [Could this have been intended to read Harry J. Emeleus?] On August 6th [1945] an atomic bomb was dropped on the city of Hiroshima …. Time has shown that reaction to the bomb was broadly similar throughout the land, including Lynchburg. … the prime interest as expressed was that it should quickly end the war. Only a few days were required for explanations of it to appear, for speculations on its threat to mankind to appear, and even an unrealistic expression that it might be a means to end war as 'only non-aggressor nations held the secret.' …. Others were revealing that … other nations would quickly be engaged in obtaining and using the 'know how.' "

Appendix D
Yellow

COSTS
5,481 billion

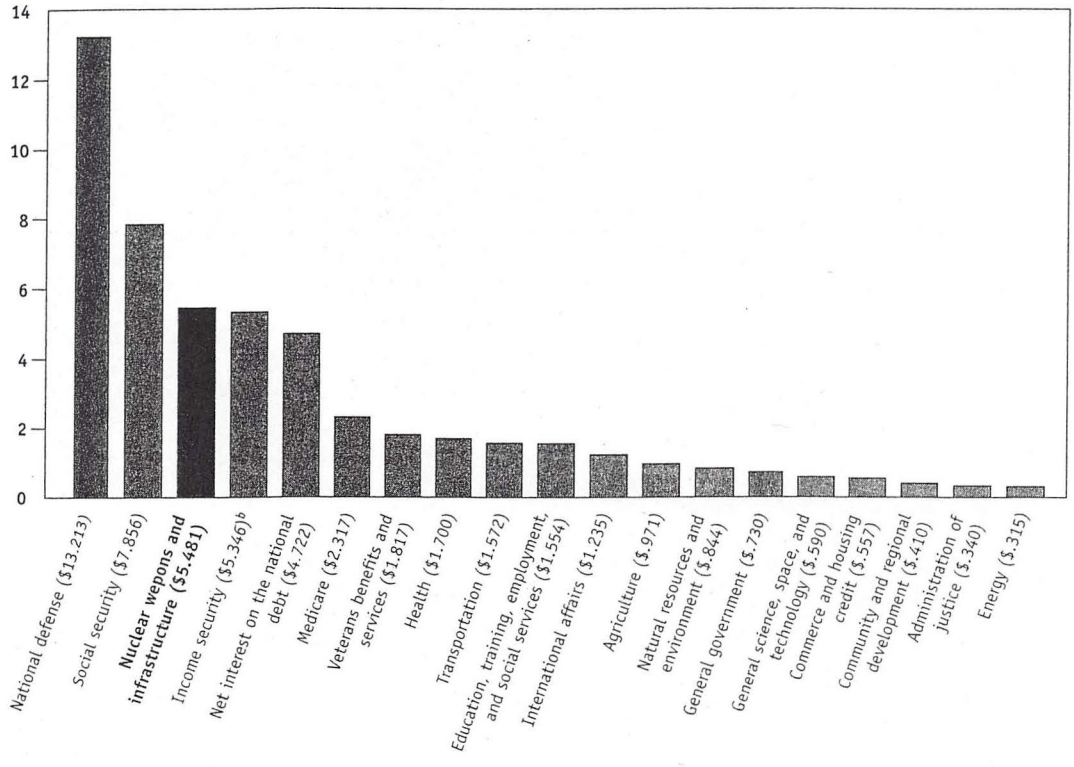
TABLE 1. Breakdown of Total Actual and Estimated U.S. Expenditures for Nuclear Weapons, 1940–96

Billions of 1996 dollars

Activity	*Cost*
Building the bomb (chapter 1)	409.4
Deploying the bomb (chapter 2)	3,241.0
Targeting and controlling the bomb (chapter 3)	831.1
Defending against the bomb (chapter 4)	937.2
Dismantling the bomb (chapter 5)	11.1
Nuclear waste management and environmental remediation (chapter 6)	45.2
Victims of the bomb (chapter 7)	2.1
Costs and consequences of nuclear secrecy (chapter 8)	3.1
Congressional oversight of the bomb (chapter 9)	0.9
Total	5,481.1

FIGURE 2. U.S. Government Historical Obligations by Function, 1940–96[a]

Trillions of 1996 dollars



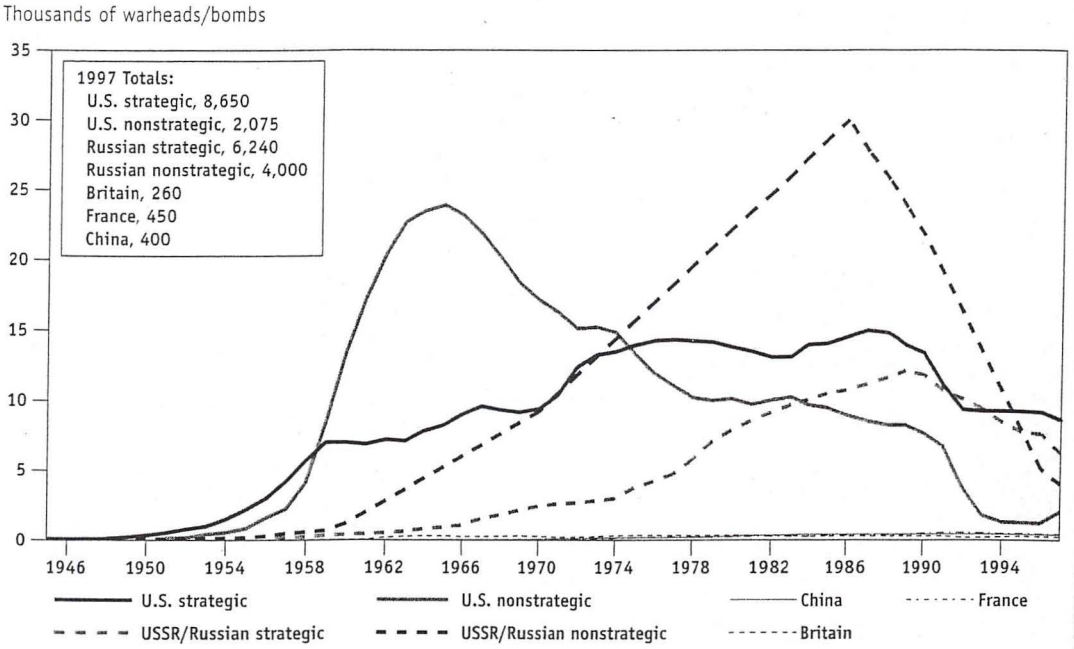
Note: National defense category has been adjusted to exclude nuclear weapons and infrastructure costs. Nuclear weapons costs are a combination of actual and estimated expenditures. Program totals do not match overall total because of rounding and the addition of undistributed offsetting receipts (not shown).

Appendix E

Buff

Atomic Audit The Costs and Consequences of U.S. Nuclear Weapons Since 1940
Stephen I. Schwartz Ed Bookings Institution Press, 1998.

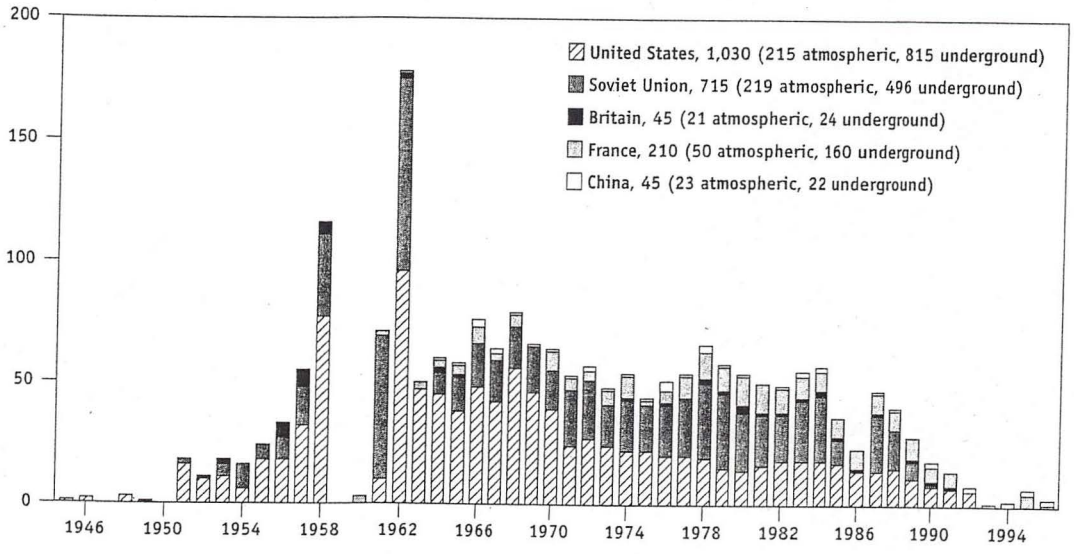
FIGURE 1-4. Global Nuclear Stockpiles, 1945-97[a]



Sources: Robert S. Norris and Thomas B. Cochran, "U.S.-U.S.S.R./Russian Strategic Offensive Nuclear Forces, 1945–1996," Nuclear Weapons Databook Working Paper 97-1 (Washington, D.C.: Natural Resources Defense Council, January 1997); Robert S. Norris, "Nuclear Arsenals of the United States, Russia, Great Britain, France and China: A Status Report," presented at the Fifth ISODARCO Beijing Seminar on Arms Control, November 12–15, 1996; Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook*, vol. 5: *British, French, and Chinese Nuclear Weapons* (Boulder, Colo.: Westview Press, 1994).

a. These figures are for active nuclear weapons, including spares. They do not include inactive but intact weapons awaiting dismantlement. For the United States, these warheads are estimated as follows: 241 (1988), 642 (1989), 752 (1990), 2,330 (1991), 5,261 (1992), 5,789 (1993), 4,916 (1994), 3,635 (1995), 2,542 (1996), and 1,350 (1997). For the USSR/Russia, these are estimated as follows: 4,277 (1986), 4,141 (1987), 3,670 (1988). 3,183 (1989), 3,485 (1990), 5,394 (1991), 6,744 (1992), 8,215 (1993), 9,933 (1994), 11,385 (1995), 12,278 (1996), and 12,200 (1997). There is a great deal of uncertainty as to the exact number of U.S.S.R./Russian nonstrategic nuclear weapons. Israel (not shown) is assumed to have 100–150 nuclear weapons.

FIGURE 1-5. Global Nuclear Weapons Tests, 1945–96[a]



Sources: U.S. Department of Energy; Natural Resources Defense Council, Nuclear Weapons Databook Project.

a. India conducted an underground nuclear test on May 18, 1974. The U.S. total does not include the two atomic bombs dropped on Hiroshima and Nagasaki in August 1945. The United States and the Soviet Union conducted 27 and 116 "peaceful nuclear explosions," respectively, which are included in the above totals.

Appendix F

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Gray

BOX 1

Visualizing the Cost of Nuclear Weapons

Distributed evenly to everyone living in the United States at the start of 1998, the total estimated cost of nuclear weapons equals $21,646 per person. Represented as bricks of new $1 bills (such as one can obtain at a bank, bound at $200 to the inch) stacked on top of one another, $5,821,027,000,000 would stretch 459,361 miles (739,117 kilometers), to the Moon and nearly back. If $1 was counted off every second, it would take almost 12 days to reach $1 million, nearly 32 years to reach $1 billion, 31,709 years to reach $1 trillion, and about 184,579 years to tally the actual and anticipated costs of nuclear weapons. Laid end to end, bricks of $1 bills equivalent to the sum actually expended on U.S. nuclear weapons since 1940 ($5,481,083,000,000) would encircle the Earth at the Equator almost 105 times, making a wall more than 8.7 feet (2.7 meters) high.

Appendix I

Gray

Atomic Audit The Costs and Consequences of U.S. Nuclear Weapons Since 1940
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On December 7, 1993, Secretary of Energy Hazel O'Leary broke with her predecessors and made a stunning admission: for the first time, the head of a nuclear weapons establishment stood before the people it was pledged to protect and admitted that it had been experimenting upon them in ways that might have harmed them. Upon learning in late 1993 of a particularly troubling series of experiments involving the injection of plutonium and uranium into unknowing subjects, O'Leary remarked, "The only thing I could think of was Nazi Germany."[60] It soon became apparent that other agencies, including the DOD, the National Aeronautics and Space Administration, and the Department of Veterans Affairs had been involved in human radiation experiments. The same month, the GAO revealed for the first time that the DOD and the AEC deliberately released radionuclides into the air from 1948 to 1952 in order to design and test radiation weapons.[61] Such weapons, discussed as far back as the Manhattan Project, are designed to create temporarily high radiation fields to kill or debilitate enemy soldiers.[62]

Thomas C. Tiller

Appendix G

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BOX 1-1

Growth and Evolution of the U.S. Nuclear Stockpile

Sixty-five warhead types have been produced and deployed, configured for approximately 116 weapons systems. The air force has used 42 types of nuclear weapons, the navy and Marine Corps 34 types, and the army 21 types. Another 25 warhead types were canceled before production, because another warhead type was chosen, or in some cases, because the delivery system itself was canceled. Some warhead types have had wide applicability, used in one configuration as a bomb, and in another as a warhead for one or perhaps several kinds of missiles.[1]

The last completely new warhead was a W88 assembled at the Pantex Plant on July 31, 1990, for the Trident II missile.[2] Although production has not resumed, Pantex recently converted approximately fifty existing B61-7 bombs into B61-11 bombs, to allow them to penetrate 10 to 20 feet (3 to 6 meters) into the earth's surface and destroy hardened underground targets. The principal modification is the emplacement of the existing "physics package" into a new needle-nosed, hardened, depleted uranium casing. This has increased the bomb's weight by 449 pounds (204 kilograms) and its length by just over 3 inches (8 centimeters). In addition, the drogue parachute has been removed, to permit the bomb to fall freely upon release and thus achieve maximum velocity before impact. While this program does not appear to contravene U.S. government pledges to foreswear development and deployment of entirely new nuclear weapons, it has raised serious questions about when a modified bomb becomes a new weapon. The B61-11 was first deployed with the B-2A bomber at Whiteman AFB in Missouri in April 1997. Scientists at Sandia National Laboratories are already designing a new nuclear glide bomb (based on the B61-11 but utilizing a new guidance system) to be dropped from the B-2A bomber, even though the air force has no requirement for such a weapon.[3]

Other warhead modifications are under way: the W76 warhead for the Trident I missile is being revalidated (to ensure its continued conformity with military requirements in the absence of nuclear testing) and the pit for the W88 is being rebuilt (to address safety concerns pertaining to accidental detonation and plutonium scattering accidents first raised in 1990). In addition, the navy and the weapons laboratories are engaged in a joint SLBM warhead protection program, the goal of which is to design and fabricate (but not actually produce) a new warhead for either the current or the next generation of SLBMs by 2004.[4]

The historic high for the stockpile was reached in 1966 when about 32,200 nuclear warheads were simultaneously active. As can be seen in figure 1-4, the U.S. buildup started in the late 1950s and consisted almost entirely of tactical nuclear weapons, made possible by the rapid AEC production expansions in the early 1950s and the Eisenhower administration's "New Look" military program, which emphasized nuclear weapons over conventional forces. Annual production of nuclear weapons exceeded 7,000 a year in 1959–60, and more than 5,000 in 1961: this amounted to almost 19,500 new warheads in three years, or a rate of about 25 per workday.

In 1954 hydrogen bombs—hundreds of times more powerful than their fission predecessors—began to enter the stockpile in great numbers, and the megatonnage increased sixtyfold in five years. It peaked in 1960 when it equaled almost 20.5 billion tons of TNT—equivalent to nearly 1.4 million Hiroshima-sized bombs—largely because the Strategic Air Command dominated the nuclear force of the day with a fleet of some 1,600 bombers, armed with thousands of high-yield bombs (the explosive power of the arsenal today equals some 120,000–130,000 Hiroshima-sized bombs).

With the sudden retirement of about 940 warheads in 1961, the megatonnage was cut almost in half. The reason was that the retired bomb, the B36, had a yield of 10 megatons. Until recently, the largest warhead in the arsenal was the 9-megaton B53 bomb, though only about fifty remained and were replaced following the introduction of the B61-11 into the active stockpile in April 1997.[5] As ballistic missiles were introduced and accuracy improved, high-yield weapons were further reduced. The rule of thumb is that making a weapon twice as accurate allows an eightfold reduction in yield to achieve the same level of destruction. Lower yields also permitted the use of substantially less plutonium and highly enriched uranium in warheads, lowering the cost of many weapons and contributing to the eventual surplus of fissile materials.

Appendix H

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BOX 7-5

A Kodak Moment

Although the AEC had few compunctions about keeping the public in the dark about the hazards of the nuclear testing program, it adopted a different policy for the Eastman Kodak Company of Rochester, New York.[1] On January 27, 1951, the AEC inaugurated its newly established continental test site—the Nevada Proving Ground (now the Nevada Test Site)—by secretly detonating a 1-kiloton nuclear device, code-named Able. Two days later, Geiger counters at Kodak's film plant on the shores of Lake Ontario detected high levels of radiation as heavy snow blanketed the city. Kodak officials became worried that the radiation would damage film stocks and cause significant financial losses.

Having experienced a similar occurrence nearly six years earlier, following the Trinity test, Kodak executives had little doubt that fallout from a nuclear test was responsible.[2] Kodak registered a complaint with the National Association of Photographic Manufacturers, who in turn telegrammed the AEC: "Tests snowfall Rochester Monday by Eastman Kodak Company give ten thousand counts per minute, whereas equal volume snow falling previous Friday gave only four hundred. Situation serious. Will report any further results obtained. What are you doing?" The following day, the AEC released a statement to the Associated Press that it was "investigating reports that snow that fell in Rochester was measurably radioactive. The reports . . . indicate that there is no possibility of harm to humans or animals. . . . All necessary precautions, including radiation surveys and patrolling, are being undertaken to insure that safety conditions are maintained."

1. Atomic Energy Commission, Report by the Director of Military Application, "Summary of Relations between the AEC and the Photographic Industry Regarding Radioactive Contamination from Atomic Weapon Tests, from January through December 1951," January 17, 1952, Record Group 325, Secretariat Collection, Box 1258, Folder MH&S 3-3 Contamination & Decontamination, formerly Confidential, declassified March 28, 1983, Department of Energy Archives; Richard L. Miller, *Under the Cloud: The Decades of Nuclear Testing* (New York: Free Press, 1986), pp. 58–59, 90–91; Peter Pringle and James Spigelman, *The Nuclear Barons* (New York: Holt, Rhinehart & Winston, 1981), pp. 179–80.

2. As the radioactive cloud from Trinity crossed the country, fallout was washed out by rainfall into the Wabash River in Indiana, more than 1,000 miles (1,609 kilometers) from Alamogordo, New Mexico. The river water, in turn, contaminated some materials such as corn husks later used to package Kodak industrial X-ray film. The film was damaged by the radiation.

Kodak's general manager also telephoned AEC Commissioner Sumner Pike to notify him of the situation. The AEC eventually replied that a test had in fact taken place and that while it appreciated the company's and the industry's concerns, it could provide no assurances that fallout from future tests would not be carried across the country by the prevailing winds. Kodak president T. J. Hargrave warned the AEC that if the company's costs to deal with the radioactivity should mount it would "very likely" have to sue the government for damages. The AEC, which took this threat very seriously, countered with an extraordinary offer. Foregoing the strict secrecy rules it enforced everywhere else, the AEC decided to send Kodak, before and after each future test, a series of classified maps—updated daily—delineating areas of potentially heavy fallout (along with general information on the type of test, for example, tower shot or air drop). A Kodak executive and representatives of several other photographic companies were granted "Q" clearances (see chapter 8) to receive and make use of the information to alter plant operations and otherwise avoid contact with contaminated materials. Thus beginning with the Operation Greenhouse series of tests in 1951 at Enewetak (and continuing presumably until the end of atmospheric testing in 1962), this industry knew in advance when a test would occur, where the fallout was expected to go, and, most important, where it went. Yet citizens living downwind of (and in closer proximity to) the test site, particularly in Nevada and Utah, were never given any such detailed early warnings. Whatever fallout did drift away from the test site—the AEC assured the public in *Atomic Tests in Nevada*, a booklet it distributed widely in Nevada and southern Utah in the mid-1950s—was exceedingly minimal: "Your potential exposure . . . will be low . . . made possible by very close attention to a variety of on-site and off-site procedures." By staying indoors for a few hours following a test or, if outside, taking a bath and dusting off clothes and shoes, the AEC noted, they could avoid harm from fallout. [3]

3. A. Costandina Titus, "Selling the Bomb: Public Relations Efforts by the Atomic Energy Commission during the 1950s and Early 1960s," *Government Publications Review*, vol. 16 (January/February 1989), pp. 15–29. For compelling documentary evidence of the consequences of this indifference, see Carole Gallagher, *American Ground Zero: The Secret Nuclear War* (Cambridge, Mass.: MIT Press, 1993).

After Nixon's 1974 resignation, pressure to increase U.S. military forces increased, while Gerald Ford and Henry Kissinger tried to maintain continuity of policy concerning détente.

Carter

Overall Jimmy Carter's strategic arms objectives were stymied by the Soviet invasion of Afghanistan, but in 1979, Carter and Brezhnev, through SALT II, agreed to reduce to one anti-ballistic missile system each and to ceilings on the number of missiles. [In 1979, a visiting speaker to the SPHEX Club, Vice-Admiral Gerald E. Miller, USN, Retired, spoke about SALT II, saying it was nothing to be worried about because the U.S. was only agreeing in the treaty to things we were going to do anyway.] The Carter years also brought substantial increases in overall military spending, a trend that would be continued and further increased under Ronald Reagan after his election in 1980.

Reagan

When Ronald Reagan first came into office as president, apparently he had little correct knowledge about nuclear weapons; yet, in the long run he participated in dramatic changes in nuclear policy. For example, for months he thought that nuclear missiles fired from submarines could be recalled. For a longer time he didn't realize that 70% of Russian and only 20% of U.S. missiles were land based; that impaired his understanding of how different ratios of weapons affected the position of the two nations concerning nuclear threats and proportionate reductions of nuclear weapons.

He didn't know or (seemingly) care about technical details concerning how SDI might work or fail to work, but he knew that he liked the idea of a shield against nuclear weapons, thought it could make the U.S. and the world safer, and stuck to his position in

favor of it. In the years since the costs of the SDI program have been enormous with, so far, little to show for it.

During Reagan's first years as president (the early 1980s), three Soviet leaders died: Brezhnev, Yuri Andropov, and Constantine Chernenko, allowing little opportunity for engagement. Then, fortunately for Soviet citizens, for the U.S., for the world, and for Ronald Reagan came reformer Mikhail Gorbachev and his initiatives at home and in the international sphere. Reagan reversed from rhetoric about the "Evil Empire" and moved toward accommodation. In 1984 he said of U.S. – Soviet relations, "The fact that neither of us likes the other system is no reason to refuse to talk. Living in this nuclear age makes it imperative that we do talk."

Reagan's It may be that his commitment to the SDI or star wars defense against nuclear weapons was prodded forward, if not initiated, by a September 14, 1982, meeting with Dr. Edward Teller as recorded in Reagan's diary: "Dr. Teller came in. He's pushing an exciting idea that nuclear weapons can be used in connection with Lasers to be non destructive except as used to intercept and destroy enemy missiles far above the earth." (Reagan Diaries, p. 100) The following spring (March 23, 1983), in a nationally televised speech on national security, Reagan "finished with a call to the Science community to join me in research starting now to develop a defensive weapon that would render nuclear missiles obsolete." (Reagan Diary, p. 140)

The idea of nuclear weapons in space was not new: In 1952 Wernher von Braun had given a speech titled "Space Superiority as a Means for Achieving World Peace" in which he pitched the potential military superiority of a space station. Von Braun

"appealed again for a $4 billion Manhattan Project-type commitment to develop this ultimate weapon to enforce Pax Americana on Earth." (Von Braun Dreamer of Space: Engineer of War, pp. 267-268) Von Braun and others evoked criticism in film ('Dr. Strangelove'), song (Tom Lehrer's "a man whose allegiance is ruled by expedience") and jokes, the latter illustrated by the punch line of a Mort Saul joke: "I aim for the stars, but sometimes I hit London." The black comedy film, Dr. Strangelove, satirized the folly of nuclear war with many priceless lines of dialogue, a few of which follow. General "Buck" Turgidson (played by George C. Scott) responded to presidential criticism about the command and control failure that allowed the launch of nuclear armed planes to bomb Russia saying, "I don't think its quite fair to condemn the whole [air force control]program because of a single slip-up, sir." President Merkin Muffley (one of three characters played by Peter Sellers) interceded in a scuffle between Turgidson and the Russian Ambassador by exclaiming, "Gentlemen, you can't fight in here! This is the war room." And President Muffley's halting and apologetic phone conversation with the presumably partying and drunk Russian Premier included, "Now then Dmitri, you know how we have always talked about the possibility of something going wrong with the bomb. Pause. The BOMB, Dmitri! The *hydrogen* bomb! Well now, one of our base commanders, he had a sort of, well, he went a little funny in the head. You know. Just a little … funny. And, uh, he went and did a silly thing. Well, I'll tell you what he did, he ordered his planes to attack your country."

One of the more dangerous real-life nuclear episodes occurred in 1983, when the Soviets interpreted Reagan's hostile rhetoric and a NATO exercise as preparations for an attack

on them. In response to what they thought was about to happen, they came close to launching a preventative first strike. Concerning such episodes as this and the arms race in general, U.S. negotiator Paul Warnke characterized the two antagonists as "apes on a treadmill" and hoped someone would be willing to get off first.

At a first meeting in November 1985 in Geneva, Reagan and Gorbachev put on the agenda the goal of cutting their nuclear arsenals in half. Before their next meeting, a chance event – the disaster at the Chernobyl power station in 1986 - tremendously affected the thinking of Soviet officials. Dimitri Yazov, who became the Soviet minister of defense afterward, said "he believed the Soviet Union could prevail in a nuclear war before Chernobyl convinced him otherwise. He realized then that even a conventional war could wreak nuclear devastation and that a nation could be destroyed by fallout from nuclear power plants attacked by conventional weapons." (Matlock, Reagan and Gorbachev, p 12)

In his Memoirs (pp. 192-3), Gorbachev wrote, "Chernobyl shed light on the sickness of our system as a whole." And, "Chernobyl was a bell calling mankind to understand what kind of age we live in now."

In the October 1986 summit meeting at Reykjavik, Iceland, Reagan and Gorbachev temporarily "got away from their handlers and began exploring ways to totally eliminate nuclear weapons." (...., 185) "Reagan's staff went into shock and pulled the president back to more modest, established administration positions." (7th, p. 196)

Eventually, the prospects for agreement stalled for the time being on Reagan's insistence on pursuing SDI, and Gorbachev's insistence on limiting SDI research to the laboratory. In arguing for agreement, Reagan at one point said to Gorbachev, "Ten years from now, he (Reagan) would be a very old man. He and Gorbachev would come to Iceland and each would bring the last nuclear missile from each country with them. And they would give a tremendous party for the whole world.... He would be very old by then, and Gorbachev would not recognize him. The President would say, 'Hello, Mikhail.' And Gorbachev would say, 'Ron, is it you?' And then they would destroy the last missiles." (The Seventh Decade, p.196), quoted from the official memorandum of comments made by Reagan to Gorbachev at their summit meeting in Reykjavik, Iceland, on October 12, 1986)

Later, after Andrei Sakharov dismissed SDI as a Maginot line in space, both Reagan and Gorbachev moved past the SDI roadblock and on to important arms reduction agreements.

In one of the stranger events of the cold war and nuclear arms race, the belief that Soviet air defense was impenetrable was shattered in May, 1987. An audacious nineteen-year old amateur German pilot, Mathias Rust, flew a rented plane from Helsinki to Moscow, eluding the Soviet air defenses, and landed on an open space by St. Basil's Cathedral and taxied to Red Square. This not only changed assumptions of how impenetrable Soviet air defense was and opened up new possibilities for arms reductions, it also became fodder for jokes. E.g., A group of Russians gathered at Red Square with suitcases were approached by a policeman who asked what they were doing. "Just waiting for the next plane to Hamburg," they replied.

At a third summit in Washington in 1987, Reagan and Gorbachev signed an intermediate-range nuclear force agreement (INF), destroying 2,700 Soviet and U.S. Missiles with a range of 300-3400 miles. The fourth summit in Moscow in May/June 1988, now named strategic Arms Reduction Talks (START), produced no new breakthroughs.

Bush I

After George H. W. Bush took office as president in 1989 he moved slowly in relation to events in the Soviet Union and Eastern Europe. Bush and Gorbachev met in December 1989 in a Maltese harbor and agreed that the cold war was over. The Soviet Union dissolved and there was much concern over the fact that control of nuclear weapons was now in the separate countries of Russia, Ukraine, Belarus and Kazakhstan.

Bush pressed ahead with START and in July 1991 signed the agreement, providing for reduction of U.S. strategic warheads from 11,602 to 8,592 by the mid- to late 1990s, and Soviet warheads from 10,877 to 6,994. After the Soviet collapse Bush and Boris Yeltsin, the leader of the new Russia, held talks just before Bush left office. They signed START II, an agreement that reduced arsenals down to 3,500 bombs and warheads on each side.

Clinton

In response to concern in the U.S. and internationally about nuclear arms in four newly independent countries after the Soviet collapse, President William Clinton helped negotiate the transfer into unitary control by Russian of nuclear arms in Ukraine, Belarus and Kazakhstan. (The Seventh Decade, 86) In 1993 the International Atomic Energy Commission, acting under the Nuclear Non-Proliferation Treaty, announced that it had