The Nuclear Challenge

First course in English online sponsored by the
Agency for the Prohibition of Nuclear Weapons
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Volume I of readings

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Some reading for the first day

At the outset of the course consider the answer to the following questions:

1. Which countries have nuclear weapons?
2. Do military planners have an unlimited choice of weaponry?
3. Under what circumstances would the use of nuclear weapons be justified?
4. How has warfare changed since the end of the Second World War?
5. What is the role of the United Nations Security Council in nuclear disarmament matters?
6. Who is A. Q. Khan?
7. What is a nuclear-weapon-free zone?
8. How many nuclear-weapon-free zones are there in the world?
9. What are some of the unresolved issues regarding nuclear-weapon-free zones?
10. What do you think about nuclear energy?

Here are various articles and newspaper clippings, most published recently, on the following questions:

1. George Orwell, “You and the Atomic Bomb” (page 2);
2. The concept of proportionality in war (4);
3. “A Nucleated Century” (5);
4. Dr. Louise Reiss, Who Helped Ban Atomic Testing, Dies at 90 (6);
5. Konrad Dannenberg, 96, top rocket scientist, dies (7);
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1. You and the Atomic Bomb[1]

by George Orwell

Considering how likely we all are to be blown to pieces by it within the next five years, the atomic bomb has not roused so much discussion as might have been expected. The newspapers have published numerous diagrams, not very helpful to the average man, of protons and neutrons doing their stuff, and there has been much reiteration of the useless statement that the bomb 'ought to be put under international control.' But curiously little has been said, at any rate in print, about the question that is of most urgent interest to all of us, namely: 'How difficult are these things to manufacture?'

Such information as we —that is, the big public— possess on this subject has come to us in a rather indirect way, apropos of President Truman's decision not to hand over certain secrets to the USSR. Some months ago, when the bomb was still only a rumour, there was a widespread belief that splitting the atom was merely a problem for the physicists, and that when they had solved it a new and devastating weapon would be within reach of almost everybody. (At any moment, so the rumour went, some lonely lunatic in a laboratory might blow civilisation to smithereens, as easily as touching off a firework.)

Had that been true, the whole trend of history would have been abruptly altered. The distinction between great states and small states would have been wiped out, and the power of the State over the individual would have been greatly weakened. However, it appears from President Truman's remarks, and various comments that have been made on them, that the bomb is fantastically expensive and that its manufacture demands an enormous industrial effort, such as only three or four countries in the world are capable of making. This point is of cardinal importance, because it may mean that the discovery of the atomic bomb, so far from reversing history, will simply intensify the trends which have been apparent for a dozen years past.

It is a commonplace that the history of civilisation is largely the history of weapons. In particular, the connection between the discovery of gunpowder and the overthrow of feudalism by the bourgeoisie has been pointed out over and over again. And though I have no doubt exceptions can be brought forward, I think the following rule would be found generally true: that ages in which the dominant weapon is expensive or difficult to make will tend to be ages of despotism, whereas when the dominant weapon is cheap and simple, the common people have a chance. Thus, for example, thanks, battleships and bombing planes are inherently tyrannical weapons, while rifles, muskets, long-bows and hand-grenades are inherently democratic weapons. A complex weapon makes the strong stronger, while a simple weapon--so long as there is no answer to it-- gives claws to the weak.

The great age of democracy and of national self-determination was the age of the musket and the rifle. After the invention of the flintlock, and before the invention of the percussion cap, the musket was a fairly efficient weapon, and at the same time so simple that it could be pro-

[1] This piece by George Orwell was originally published by the *Tribune* 19 October 1945 within months after atomic bombs were dropped over Hiroshima and Nagasaki, Japan by the only country ever to have used them to kill people and destroy cities, viz., the U.S.A. Orwell had written enough about the latter that had been remarkably stupid, but this particular piece was exceptional for the insights it shared about the world dispensation that lay ahead in the age of atomic weaponry. In addition, it was clear that the groundwork for his novel, *Nineteen Eighty-four* had been completed by this writing. This essay was later published in George Orwell, *The Collected Essays, Journalism and Letters of George Orwell*, ed. Sonia Orwell and Ian Angus, 4 vols. (New York: Harcourt Brace Jovanovich, 1968), 4:504.

duced almost anywhere. Its combination of qualities made possible the success of the American and French revolutions, and made a popular insurrection a more serious business than it could be in our own day. After the musket came the breech-loading rifle. This was a comparatively complex thing, but it could still be produced in scores of countries, and it was cheap, easily smuggled and economical of ammunition. Even the most backward nation could always get hold of rifles from one source or another, so that Boers, Bulgars, Abyssinians, Moroccans--even Tibetans-- could put up a fight for their independence, sometimes with success. But thereafter every development in military technique has favoured the State as against the individual, and the industrialised country as against the backward one. There are fewer and fewer foci of power. Already, in 1939, there were only five states capable of waging war on the grand scale, and now there are only three--ultimately, perhaps, only two. This trend has been obvious for years, and was pointed out by a few observers even before 1914. The one thing that might reverse it is the discovery of a weapon--or, to put it more broadly, of a method of fighting--not dependent on huge concentrations of industrial plant.

From various symptoms one can infer that the Russians do not yet possess the secret of making the atomic bomb; on the other hand, the consensus of opinion seems to be that they will possess it within a few years. So we have before us the prospect of two or three monstrous super-states, each possessed of a weapon by which millions of people can be wiped out in a few seconds, dividing the world between them. It has been rather hastily assumed that this means bigger and bloodier wars, and perhaps an actual end to the machine civilisation. But suppose--and really this the likeliest development--that the surviving great nations make a tacit agreement never to use the atomic bomb against one another? Suppose they only use it, or the threat of it, against people who are unable to retaliate? In that case we are back where we were before, the only difference being that power is concentrated in still fewer hands and that the outlook for subject peoples and oppressed classes is still more hopeless.

When James Burnham wrote *The Managerial Revolution* it seemed probable to many Americans that the Germans would win the European end of the war, and it was therefore natural to assume that Germany and not Russia would dominate the Eurasian land mass, while Japan would remain master of East Asia. This was a miscalculation, but it does not affect the main argument. For Burnham's geographical picture of the new world has turned out to be correct. More and more obviously the surface of the earth is being parceled off into three great empires, each self-contained and cut off from contact with the outer world, and each ruled, under one disguise or another, by a self-elected oligarchy. The haggling as to where the frontiers are to be drawn is still going on, and will continue for some years, and the third of the three super-states--East Asia, dominated by China--is still potential rather than actual. But the general drift is unmistakable, and every scientific discovery of recent years has accelerated it.

We were once told that the aeroplane had 'abolished frontiers'; actually it is only since the aeroplane became a serious weapon that frontiers have become definitely impassable. The radio was once expected to promote international understanding and co-operation; it has turned out to be a means of insulating one nation from another. The atomic bomb may complete the process by robbing the exploited classes and peoples of all power to revolt, and at the same time putting the possessors of the bomb on a basis of military equality. Unable to conquer one another, they are likely to continue ruling the world between them, and it is difficult to see how the balance can be upset except by slow and unpredictable demographic changes.

For forty or fifty years past, Mr. H. G. Wells and others have been warning us that man is in danger of destroying himself with his own weapons, leaving the ants or some other gregarious

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species to take over. Anyone who has seen the ruined cities of Germany will find this notion at least thinkable. Nevertheless, looking at the world as a whole, the drift for many decades has been not towards anarchy but towards the reimposition of slavery. We may be heading not for general breakdown but for an epoch as horribly stable as the slave empires of antiquity. James Burnham's theory has been much discussed, but few people have yet considered its ideological implications--that is, the kind of world-view, the kind of beliefs, and the social structure that would probably prevail in a state which was at once UNCONQUERABLE and in a permanent state of 'cold war' with its neighbors.

Had the atomic bomb turned out to be something as cheap and easily manufactured as a bicycle or an alarm clock, it might well have plunged us back into barbarism, but it might, on the other hand, have meant the end of national sovereignty and of the highly-centralised police state. If, as seems to be the case, it is a rare and costly object as difficult to produce as a battleship, it is likelier to put an end to large-scale wars at the cost of prolonging indefinitely a 'peace that is no peace'.

2. The laws of war

Proportional to what?

From *The Economist* print edition December 30th 2008.

The rights and wrongs of killing civilians

In the arithmetic of death, the latest fight between Israel and Hamas has been an unequal contest: more than 350 Palestinians killed in Israeli air strikes in the first four days, many of them civilians, against four Israelis killed by Hamas's rockets. But does such one-sided bloodshed make Israel guilty of using "disproportionate force", as argued by, among others, Amnesty International and Nicolas Sarkozy, the French president, just ending his six-month presidency of the European Union?

Proportionality is intimately bound up with notions of the just war, and has been enshrined in treaties regulating warfare's conduct since the Hague Convention of 1907. But familiar as it is, proportionality is a slippery idea. It has two different meanings in Western theory. On the grounds for going to war, *jus ad bellum*, the cause must be important enough to justify force; any good that will follow must outweigh the inevitable pain and destruction. In the conduct of war, *jus in bello*, any action must weigh the military gain against the likely harm to civilians.

Human-rights law has developed mostly in terms of *jus in bello*. The Geneva Conventions of 1949, dealing mainly with the protection of non-combatants in conflicts between states, were updated in 1977 to include more explicitly wars within states. Israel and the United States have not ratified the later protocols, though they do not really question the principle that armies must avoid "an attack which may be expected to cause incidental loss of civilian life, injury to civilians, damage to civilian objects, or a combination thereof, which would be excessive in relation to the concrete and direct military advantage anticipated".

The arguments are over the nebulous facts of a particular incident. Did Israel do enough to avoid civilian deaths? Do Palestinian policemen count as combatants? For Israel, the use of overwhelming force is both legitimate and, given its desire to restore its "deterrent effect" towards its enemies, sometimes necessary. Israel says that intent is what matters: it says it tries to avoid civilian deaths, whereas Hamas deliberately seeks to kill Israeli civilians with its

rockets, relatively ineffective as they may be. Hamas responds with two arguments: as the disproportionately weaker party, Palestinians must use the crude means at their disposal to free their lands from Israeli occupation; more controversially, it often says there are no Israeli civilians since most Israelis serve in the army.

Proportionality in *jus ad bellum* and *jus in bello* are hard to separate: indiscriminate killing will colour the view of whether a war is justified; and even proportionate actions in battle will be denounced if the war is deemed unjust. In the Israeli-Palestinian context, arguments about legality fast turn into ones about history. If the tit-for-tat starting point is Hamas's rocket attacks, then the Israelis have a right to defend themselves; if it is Israel's occupation of Palestine or the dispossession of Palestinians when Israel was born in 1948, then Palestinians can argue for a right to resist. Proportional or not, the killing of innocents will go on until the dispute is settled.

3. A Nucleated Century

Editorial published in *The New York Times*, March 22, 2011

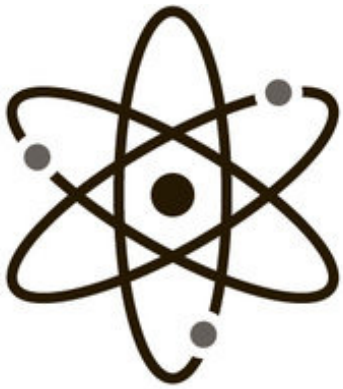
If you asked someone to draw an atom, he or she would probably draw something like a cock-eyed solar system. The sun — the nucleus — is at the center, and the planets — the electrons — orbit in several different planes.

The critical discovery in this atomic model emerged a century ago in a talk before the Manchester Literary and Philosophical Society in March 1911 and a paper published soon after in the Philosophical Magazine. Both were by Ernest Rutherford, who had won the 1908 Nobel Prize in Chemistry in part for his discovery of the alpha particle, which he later proved was the nucleus of a helium atom.

By 1911, scientists had already measured the charge and mass of an electron. But no one was sure how the atom was structured. Among his endless contributions to atomic theory, Rutherford explained a curious phenomenon. When fired at an extremely thin sheet of gold foil, some alpha particles scattered at surprising angles.

A few even bounced straight back at the observer, which Rutherford said was as unexpected as firing a cannon shell at tissue paper and having it come back and hit you.

The answer, Rutherford wrote, is that "the atom consists of a central charge" that is "concentrated at a point" — a point soon called the nucleus. A near collision with the nucleus caused the alpha particle to deflect. A direct collision caused it to bounce straight back. Compared to the whole atom, Rutherford said, the nucleus was like "a fly in a cathedral."



As the scientist Freeman Dyson later wrote, finding the nucleus was the start of nuclear physics, which has transformed our picture of the atom. Now it looks something like a composite of quarks surrounded by clouds of uncertainty. More accurate. Much harder to draw.

4. Dr. Louise Reiss, Who Helped Ban Atomic Testing, Dies at 90

By Dennis Hevesi
The New York Times, January 10, 2011

Dr. Louise Reiss, who directed a study that examined hundreds of thousands of baby teeth during the cold war and helped persuade the world's leading powers to ban nuclear testing in the atmosphere, died Jan. 1 at her home in Pinecrest, Fla. She was 90.

Her son, Eric, confirmed her death.

Dr. Reiss and her husband, Eric, both physicians, were founding members of the Greater St. Louis Citizens' Committee for Nuclear Information, which joined with the schools of dentistry at Washington University in St. Louis and St. Louis University in 1959 to create the Baby Tooth Survey.

The goal was to show that radioactive fallout from nuclear testing was getting into the nation's food supply and ultimately working its way into human bones and teeth. And the study succeeded.

Dr. Reiss was named director of the project and, along with her husband, worked with other scientists in the project's laboratory.

Over the next 12 years, the project collected nearly 320,000 baby teeth. Dr. Reiss, who was director for two years, organized the campaign. Young donors received badges bearing gap-toothed cartoon faces declaring, "I gave my tooth to science."

As *The Nation* reported in June 1959: "Dr. Louise Reiss and her assistants have had extraordinary success in getting local schools — public, private and parochial — to help in the teeth collecting. Some 250,000 forms have been distributed to reach all lower-grade students. At present, baby teeth are reaching the little office on West Pine Boulevard at the rate of about 50 a day."

The teeth were sent to the laboratory at Washington University, which tested them for strontium 90, one of more than 100 chemicals created in nuclear explosions and reactors. Strontium 90 is chemically similar to calcium and, when ingested in food and water, attaches to bones and teeth. It is radioactive and known to cause cancer.

The study ultimately found that children born in St. Louis in 1963 had 50 times as much strontium 90 in their teeth as children born in 1950 — before most of the atomic tests. Its initial findings were published in the journal Science in 1961 and came to the attention of President John F. Kennedy as he negotiated with the Soviet Union for a ban on atmospheric nuclear testing.

From 1945 to 1963, the United States tested 206 nuclear weapons in the atmosphere — 100 in Nevada and 106 in the South Pacific — while the Soviet Union conducted 216 such tests. Fallout was swept away by prevailing winds and returned through precipitation, some of it falling on farms and dairies.

In June 1963, Dr. Reiss's husband presented the findings in testimony before a Senate committee in support of a treaty. Two months later, the Partial Test Ban Treaty between the United States, the Soviet Union and Britain was signed.

Dr. Reiss was proud that the project achieved its aims through science rather than politics. "I continue to be moved by the knowledge that a group of organized people can effectively pres-

sure government if they come up with data instead of rhetoric," she wrote in a letter to a colleague in the study in 1996.

The Baby Tooth Survey ended in 1970. During a second testing phase, it found a 50 percent decline in strontium 90 in children born in 1968, compared with those born five years earlier, immediately after the treaty went into effect.

Dr. Reiss was central to the project, said Barry Commoner, an environmental scientist who was one of the founders of the survey. "She was responsible for day-to-day handling of the material," he said, "and helped coordinate the whole scientific project."

Louise Marie Zibold was born in Queens on Feb. 23, 1920, to Carl and Marie Zibold. After receiving her medical degree from the Woman's Medical College of Pennsylvania in 1945, she met her future husband while a resident at Philadelphia General Hospital. The couple moved to St. Louis in 1954 after he accepted a position at the Washington University Medical School. She worked as an internist with the City Health Department.

Dr. Eric Reiss died in 1988. Besides her son, Dr. Reiss is survived by two grandchildren and three great-grandchildren.

The impact of the tooth survey has increased. In 2001, Washington University recovered 85,000 teeth not used in the original study that it had stored in a World War II ammunition bunker 20 miles west of St. Louis. Each tooth was in a small envelope attached to a card identifying its donor.

The university gave the collection to the Radiation and Public Health Project, an independent research group, which, in a new study, addressed an issue not examined in the original survey: cancer risks from fallout, rather than just measurements of strontium 90 levels.

Last month, results of the new study were published in The International Journal of Health Services. Its principal finding, based on a small sample, was that the donors from the original project who died of cancer by age 50 had more than twice the average strontium 90 levels of donors who were healthy at 50, suggesting that higher levels of the chemical raised cancer risk.

"Our study is just a step in the effort to understand how many Americans were harmed by atom bomb fallout," said Joseph Mangano, executive director of the Radiation and Public Health Project. "We plan to continue this work by testing more teeth and addressing diseases in addition to cancer, such as thyroid disease and genetic defects."

5. Konrad Dannenberg, 96, Top Rocket Scientist, Dies

By Jeremy Pearce
From *The New York Times* February 23rd 2009

Konrad Dannenberg, a rocket propulsion expert and one of the last of a 1940s German military-scientific team that switched allegiances at the end of World War II and helped American space and missile programs in the cold war, died on Feb. 16 in Huntsville, Ala. He was 96 and lived in Madison, Ala.

Mr. Dannenberg's death was confirmed by a spokesman for the Marshall Space Flight Center in Huntsville, run by the National Aeronautics and Space Administration.

From 1960 to 1973, Mr. Dannenberg helped design propulsion systems for liquid-fueled Saturn rockets at Marshall to carry ever larger payloads into space. In 1969, a Saturn V rocket propelled astronauts of the Apollo 11 mission to make the first manned landing on the Moon.

The Saturn's successes had their roots in German military research and Wernher von Braun's development of the V-2 rocket, an early ballistic missile used by the Nazis as a weapon of terror. In 1944 and 1945, more than 3,000 of the rockets were launched at targets in Britain and on the European mainland, and they killed 2,700 civilians around London alone. The V-2 carried a 1,000-pound payload of high explosives into the stratosphere, to rain down in a descent that was difficult to pinpoint and impossible to defend against.

Mr. Dannenberg, who trained as a mechanical engineer, had been released from the German army in 1940 to assist in the V-2's design and refinement at Peenemünde, a testing site along the Baltic coast. There he worked on the rocket's engine efficiency and later on drawings to speed production.

At the end of the war in 1945, Mr. Dannenberg and more than 100 fellow scientists were taken to Fort Bliss, Tex., for debriefing and a review of their work. The German team, still led by Dr. von Braun, became an early and influential chorus supporting American efforts to put a satellite into orbit, and ultimately to pursue manned space exploration.

In 1950, Mr. Dannenberg accompanied members of the team to Alabama, where they refined the V-2's design into a more robust medium-range ballistic missile at Redstone Arsenal. Versions of the missile were fitted with nuclear warheads and were also used in the launching of communications satellites and in other scientific research.

In 1958, a Redstone missile was used in the launching of Explorer 1, the first successful American satellite. Mr. Dannenberg helped oversee production of the missile's engines. Before moving to Marshall in 1960, he worked on a longer-range version of the Redstone called the Jupiter.

In the decades that followed, questions about the wartime origins of these spectacular advances resurfaced. In 1992, the German aerospace industry announced plans to celebrate the 50th anniversary of the V-2 and provoked an outrage. Critics in Britain and Germany cited the victims' memories and pointed out that 10,000 to 20,000 Russian, Polish and Jewish slave laborers had died in digging underground rocket factories. It was also revealed that Dr. von Braun had held an officer's commission in the SS.

For his part, Mr. Dannenberg, who was not a member of the Nazi party, said that the Peenemünde team had not been involved in the factory brutality, that the rocket science was pure, and that the German "army was the only rich uncle with enough money to pay for the things we wanted to do."

In 1985, Mr. Dannenberg and 22 German scientists petitioned President Ronald Reagan to reinstate the citizenship of Arthur Rudolph, a colleague from the Peenemünde facility who later worked for NASA and was accused by the Justice Department of being responsible for inhumane living conditions at wartime V-2 factories. Mr. Dannenberg said the SS had been to blame for the conditions.

Konrad Dannenberg was born in Weissenfels, Germany. He earned a master's degree in mechanical engineering from the Technical University of Hanover.

Mr. Dannenberg is survived by his wife, Jackie; a son and two grandchildren.

Mr. Dannenberg continued to raise his voice for research well into his 90s. He lectured at a summer camp held at Marshall for budding engineers and astronauts, and he was often interviewed about rocketry and his experiences in the infancy of aerospace exploration.

In 2007, he suggested that efforts by private industry to establish tourism in space might embarrass nations and help push their budgets and borders a bit further.

He also said he sensed a weakening American commitment to space exploration. "I think it's a foolish thing," Mr. Dannenberg said.

"As von Braun said, 'If you do it when you need it, it's too late. You missed the boat.'"

6. Samuel T. Cohen, Neutron Bomb Inventor, Dies at 89

By ROBERT D. McFADDEN

The New York Times, December 1, 2010

Samuel T. Cohen, the physicist who invented the small tactical nuclear weapon known as the neutron bomb, a controversial device designed to kill enemy troops with subatomic particles but leave battlefields and cities relatively intact, died on Sunday at his home in Los Angeles. He was 89.

The cause was complications of stomach cancer, his son Paul said.

Unlike J. Robert Oppenheimer and Edward Teller, the respective fathers of the atomic and hydrogen bombs, Mr. Cohen was not well known outside government and scientific circles, although his work for years influenced the international debate over the deployment and potential uses of nuclear arms.

In contrast to strategic warheads, which can kill millions and level cities, and smaller short-range tactical nuclear arms designed to wipe out battlefield forces, the neutron bomb minimized blast and heat. Instead, it maximized a barrage of infinitesimal neutrons that zipped through tanks, buildings and other structures and killed people, usually by destroying the central nervous system, and all other life forms.

While doubters questioned the usefulness, logic and ethics of killing people and sparing property, Mr. Cohen called his bomb a "sane" and "moral" weapon that could limit death, destruction and radioactive contamination, targeting combatants while leaving civilians and towns unscathed. He insisted that many critics misunderstood or purposely misrepresented his ideas for political, economic or mercenary reasons.

A specialist in the radiological effects of nuclear weapons, he relentlessly promoted the neutron bomb for much of his life, writing books and articles, conferring with presidents and cabinet officials, taking his case to Congressional committees, scientific bodies and international forums. He won many converts, but ultimately failed to persuade the United States to integrate the device into its tactical nuclear arsenal.

The Reagan administration developed but never deployed the weapons in the 1980s. France, Israel and the Soviet Union were believed to have added versions of the bomb to their arsenals. Western military planners rejected their use in the Vietnam War and regarded them only as a possible deterrent to superior Soviet tank forces in Europe. But the end of the cold war obviated even that purpose.

A graduate of the University of California at Los Angeles, Mr. Cohen was recruited while in the Army in World War II for the Manhattan Project, which developed the first atomic bomb

at Los Alamos, N.M. After the war, he joined the RAND Corporation and in 1958 designed the neutron bomb as a way to target a cluster of enemy forces while sparing infrastructure and distant civilian populations.

Fired via a missile or an artillery shell and detonated a quarter-mile above ground, his bomb limited death to an area less than a mile across, avoiding wider indiscriminate slaughter and destruction. It was not a radioactively "clean" bomb, but its neutrons dissipated quickly, leaving no long-term contamination that could render entire regions uninhabitable for decades.

But many military planners scoffed at the idea of a nuclear bomb that limited killing and destruction, and insisted that deployment would escalate the arms race and make nuclear war more likely. The device was anathema to defense contractors and armed services with vested interests in nuclear arsenals. Even peace activists denounced it as "a capitalist weapon" because it killed people but spared the real estate.

Washington rejected the bomb repeatedly. The Kennedy administration said it might jeopardize a test-ban moratorium. The Johnson administration said its use in Vietnam might raise the specter of Hiroshima — Asians again slaughtered by American nuclear bombs — drawing worldwide condemnation. In 1978, President Jimmy Carter said development might impede disarmament prospects.

In 1981, President Ronald Reagan ordered 700 neutron warheads built to oppose Soviet tank forces in Europe. He called it "the first weapon that's come along in a long time that could easily and economically alter the balance of power." But deployment to the North Atlantic alliance was canceled after a storm of antinuclear protests across Europe. President George H. W. Bush ordered the stockpile scrapped.

By 1982, Mr. Cohen had abandoned his deployment quest. But he continued for the rest of his life to defend the bomb as practical and humane.

"It's the most sane and moral weapon ever devised," he said in a telephone interview for this obituary in September. "It's the only nuclear weapon in history that makes sense in waging war. When the war is over, the world is still intact."

Samuel Theodore Cohen was born in Brooklyn on Jan. 25, 1921, to Lazarus and Jenny Cohen, Austrian Jews who migrated to the United States by way of Britain. His father was a carpenter and his mother a housewife who rigidly controlled family diets, purges and even breathing habits (believing it unhealthy to breathe through the mouth). The boy had allergies, eye problems and other ailments, and for years was subjected to daily ice-water showers to toughen him up.

The family moved to Los Angeles when he was 4. He was a brilliant student at public schools and U.C.L.A., where he graduated in 1943 with a physics degree. He joined the wartime Army and was posted to the Massachusetts Institute of Technology for advanced training in mathematics and physics.

In 1944 he was tapped for the Manhattan Project to analyze radioactivity in nuclear fission. He worked on "Fat Man," the bomb dropped on Nagasaki in 1945, days after "Little Boy" destroyed Hiroshima.

Mr. Cohen was married twice. His first marriage, to Barbara Bissell in 1948, ended in divorce in 1952. In 1960, he married Margaret Munnemann. She survives him, as do their three children, Carla Nagler, Paul and Thomas; and three grandchildren.

Mr. Cohen joined RAND in Santa Monica in 1947 and 11 years later designed the neutron bomb as a consultant to the Lawrence Livermore National Laboratory. Many technical features of what the Pentagon called an "enhanced radiation weapon" had been known for years, and scientists had theorized about a nuclear device that would release most of its energy as radiation.

All nuclear explosions produce a rain of potentially lethal neutrons, uncharged particles from an atom's nucleus, and Mr. Cohen, by adjusting components and reshaping the bomb shell, limited the blast and released more energy as neutrons — so tiny they passed easily through solid inanimate objects, but killed all living things in their path.

The military successfully tested the bomb, and over the next two decades Mr. Cohen campaigned for its deployment without success. He left RAND in 1969, but continued writing about the bomb. His articles appeared in *The Washington Post*, *The New York Times, The Wall Street Journal* and other publications. He was featured in a 1992 segment of the BBC-TV series "Pandora's Box."

His books included "Tactical Nuclear Weapons: An Examination of the Issues" (1978); "The Neutron Bomb: Political, Technological and Military Issues" (1978); "Checkmate on War" (1980); "The Truth About the Neutron Bomb" (1983); "We Can Prevent World War III" (1985); and "Nuclear Weapons, Policies and the Test Ban Issue" (1987). His memoir, "Shame: Confessions of the Father of the Neutron Bomb," was published on the Internet in 2000.

In recent years, Mr. Cohen prominently warned of a black market substance called red mercury, supposedly capable of compressing fusion materials to detonate a nuclear device as small as a baseball — ideal for terrorists. Most scientists call the substance mythical, and stories about it, many circulating on the Internet, are widely regarded as spurious.

7. The nuclear industry

Unexpected reaction
The handful of firms that build nuclear reactors face new competition
Feb 4th 2010 | NEW YORK, PARIS AND TOKYO
From *The Economist* print edition

THE nuclear industry got an unexpected boost from Barack Obama in his State of the Union address last month. The president pledged to build a "new generation of safe, clean nuclear power plants". On February 1st he followed that up in his proposed budget for 2011 by tripling to $54 billion the value of loans for new nuclear plants the government is offering to guarantee. Elsewhere, too, prospects for the business look good: the United Arab Emirates (UAE) completed a tender for four nuclear plants in December, Vietnam is planning a similar deal this year and many other countries, from Italy to Indonesia, are hoping to build new reactors soon.

Yet the $40 billion contract in the UAE, won by a consortium led by Korean Electric Power Corporation (KEPCO), South Korea's largely state-owned electricity monopoly, has caused consternation among the six big firms that have dominated the industry for decades: GE and Westinghouse of America, Areva of France, and Toshiba, Hitachi and Mitsubishi Heavy Industries of Japan. Russian and Chinese firms hope to follow the Koreans' lead. Suddenly the incumbents are confronted by emerging-market "national champions" with the full backing of their governments—an invaluable asset in a high-liability business like nuclear power.

"If you find out how they won, let me know," quips Hirotada Nagashima, a senior executive in the nuclear division of Hitachi, whose joint venture with GE lost out to Kepco, as did a consortium of Areva and other French industrial behemoths, including Electricité de France (EDF), Total and GDF-Suez. But there is little mystery. The South Korean consortium, which includes the heavy-industry arms of Doosan, Hyundai and Samsung, three of the country's biggest conglomerates, and uses some of Westinghouse's technology, has worked together for decades, building and operating most of South Korea's 20 reactors. It offered not just to build the plants, but also to run them and even to find the fuel they will need—at a fixed price, for the most part. "It was very easy to bring them together and offer the UAE a complete package," says Mark Yoon of CLSA, a financial-research firm.

The South Korean government also played its part. The president, Lee Myung-bak, flew off to Abu Dhabi on the eve of the decision to gladhand the locals, promising to help the barren statelet recreate South Korea's economic miracle. Hiroki Mitsumata, director of nuclear energy at Japan's Ministry of Economy, Trade and Industry (METI), believes that support from the South Korean government may also have allowed Kepco to offer the lowest price, because the state can backstop cost overruns and accident liability.

Nicolas Sarkozy, France's president, lobbied enthusiastically on behalf of the French consortium, whose leading members are also largely state-owned. It too could offer full service, in that Areva supplies fuel and manages waste in addition to designing reactors, while EDF runs more nuclear plants than any other firm. But the partners originally wanted to sign separate contracts rather than offer an all-in deal. Worse, their bid was 50% more expensive, thanks both to the strong euro and a more steel- and concrete-laden design, which Areva says makes its reactors safer—an idea the authorities in the UAE dispute. EDF has also suffered numerous operational glitches of late, while Areva's flagship new reactor, under construction in Finland, is woefully over budget and behind schedule. The Koreans, in contrast, have a sterling record in both construction and operation.

EDF has responded to the loss by attempting to unify the French nuclear industry under its control. Last November Henri Proglio, its incoming boss, said the French nuclear industry was

dysfunctional and that combining a nuclear-fuel business with reactor design in Areva had been a mistake. Instead he suggested linking design and generation. But Areva argues that adding its reactor unit to EDF would make it extremely difficult for France to export nuclear plants to the utility's foreign competitors, such as Germany's E.ON, which is currently a customer of Areva.

In December the French government appointed François Roussely, a former boss of EDF and a friend of Mr Proglio's, to produce a report on the nuclear industry, which is due in April. Mr Proglio's ideas have provoked open war between the two firms: in January Areva briefly stopped collecting waste fuel from EDF's plants following a long-running dispute over prices, until the government intervened.

The Japanese and American nuclear firms, for their part, say they cannot compete with state-backed bids. Danny Roderick of GE's and Hitachi's nuclear joint venture thinks the South Korean bid may prove "too good to be true" and wonders whether it will be able to stick to its budget and schedule. Big American utilities have little interest in teaming up with nuclear vendors to mount joint bids abroad; Japanese ones have a distressing record of falsified inspection reports and frequent outages. And the governments in both countries would find it difficult to favour one local nuclear firm over another.

But not all the problems facing the Japanese and Americans are of others' making. The firms form a noodle soup of alliances and tangled technologies. Despite their joint venture, Hitachi and GE are pushing two competing reactors. They recently developed a third design with Toshiba, but after Toshiba bought Westinghouse in 2006, it also began to promote the latter's technology. Areva and Mistubishi Heavy have rival designs of their own, but have also set up a joint venture to promote yet another type of reactor. "It's chaos at the vendor level," says an analyst in Japan.

The next test of the nuclear vendors' mettle will be the bidding this year to build four nuclear reactors in Vietnam. Mr Mitsumata of METI thinks the government-run Japan Bank for International Co-operation, an export-credit and project-finance provider, and state-backed trade insurance could be used to boost the Japanese entrants. There is talk of a joint bid with a big utility such as Tokyo Electric Power. The government "is trying to increase the level of industrial support for the Vietnam project and the utility companies have been talking more seriously about that," he says. But Kepco has hinted that it, too, is eyeing Vietnam—as well as other middle-income countries such as Turkey, Jordan, Indonesia, Thailand and South Africa.

American and Japanese nuclear firms' chances of maintaining an edge may depend on how far their governments are willing to push nuclear power at home. Mr Obama's sudden enthusiasm has given the American firms hope. But the Department of Energy has yet to hand out any of the previous batch of loan guarantees approved in 2005. Regulators in Florida have squelched local utilities' plans to build new reactors. Recriminations about rising costs have held up another project in Texas. It is a far cry from South Korea, where six reactors are under construction and another 14 are on the drawing board.

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8. KEPCO wins a nuclear contract

Atomic dawn
Dec 30th 2009 | SEOUL
From *The Economist* print edition
Korean reactors trump Western ones

It is usually the northerly of the two Koreas that attracts attention for its nuclear prowess. But on December 27th a South Korean consortium seized the limelight by winning a $20 billion contract to build four nuclear reactors in the United Arab Emirates. The consortium, led by Korea Electric Power (KEPCO), a state-controlled utility, could earn another $20 billion running the plants over their projected lifespan of 60 years.

Competition for the contract had been stiff. GE and Hitachi, two engineering giants, had launched a joint bid, as had a consortium led by France's nuclear champion, Areva. France's president, Nicolas Sarkozy, had lobbied energetically on behalf of the latter group. But South Korea's president, Lee Myung-bak, was equally keen. As a former boss of Hyundai Construction, he has first-hand experience both of vying for contracts in the Gulf and of building nuclear plants. Mr Lee is said to have promised to share some tips on boosting manufacturing, a fond ambition of the Emirates.

But the chief allure of the Korean bid was price. It was reportedly billions of dollars cheaper than the others, albeit for smaller and less hardened plants. KEPCO's nuclear subsidiary, which runs 20 nuclear plants in South Korea and plans to build 20 more, has a record of building reactors quickly and running them efficiently—unlike many of its Western counterparts. "We're cheap, durable and dependable," says Kevin Kang of KEPCO, which is also hoping to build reactors in India, Jordan and Turkey among other places. Although the consortium includes Westinghouse, a subsidiary of Toshiba of Japan, most of the technology is Korean. In developing countries, at least, the West's nuclear giants face a formidable new rival.

9. Nuclear power in the Nordic countries

Recalled to half-life

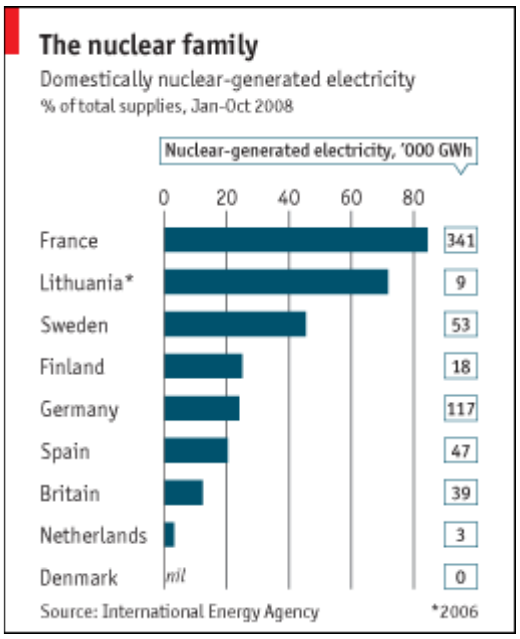
HELSINKI
From *The Economist* print edition February 12th 2009.

A surprising revival in previously reviled nuclear power

In what may be his boldest move so far, Sweden's Fredrik Reinfeldt has shredded a central part of the election manifesto on which his centre-right government fought the election in 2006. The four parties in his coalition have long been split over nuclear power. So they agreed in the manifesto to keep all matters atomic off the agenda until their term expired in 2010. But a combination of tight climate-change targets, energy-security worries and a wobbly economy has now caused a rethink. On February 5th Mr Reinfeldt unveiled a plan to reverse Sweden's 30-year ban on building new nuclear capacity.

The new pro-nuclear policy is echoed in some of Sweden's neighbours. On the very day that Mr Reinfeldt announced his proposals Fortum, a Finnish energy group, lodged an application to build a new nuclear plant. This would be the country's sixth. Four are in operation and a fifth (the world's largest) is under construction at Olkiluoto. On the southern shore of the Baltic Sea, Poland plans two nuclear-power stations to reduce its dependence on coal. The Poles are also talking to Lithuania, Latvia and Estonia about a joint consortium to build a replacement for Lithuania's outdated Ignalina nuclear-power complex. Only the Danes and, to a lesser extent, the Germans are still anti-nuclear.

Mr Reinfeldt and his coalition partners should have little difficulty getting the necessary legislation through the Swedish parliament next month. But broad cross-party support would still be desirable to provide stability and ward off any risk of a policy reversal by a future government. So the leftist opposition has been invited to talks to mull over an energy package that also includes measures to cut carbon emissions and boost renewable energy. But like the centre-right, the left is divided over nuclear power: the Social Democrats are split, while the Greens and the Left Party are firmly against.



Jan Björklund, the pro-nuclear education minister, has appealed to the opposition to "throw the battle-axe in the lake" and get on board for the sake of Swedish industry and the climate. But the opposition doubts the sincerity of such appeals. It claims to have been asking the government to discuss energy for almost three years but to have been ignored. "Now they just want us to rubber-stamp a done deal," comments one opposition figure. There are suspicions that the government may be using its nuclear plan as a way of sowing discord within the opposition just as it is trying to formulate a joint platform for the 2010 election.

Whatever the truth, the Social Democrats are unlikely to sign up to a deal involving the construction of as many as ten new nuclear plants. So some shrinking of the government's ambitions may be necessary. But Mr Reinfeldt will not give up without a fight. He has already scored a strategic victory by persuading the Centre Party (a junior coalition member) to revoke its 1980 decision to phase out nuclear power. Maud Olofsson, the Centre Party leader, admits she may not like it, "but we can live with the fact that nuclear power will be part of Swedish electricity production for the foreseeable future."

To Mr Reinfeldt's advantage, many Swedes seem to reason similarly. A Novus Group opinion poll taken after the energy plan was announced found 57% of respondents agreeing that it should be possible to replace old nuclear plants with new. Fully 70% said they thought the government's energy package as a whole was good. But opposition leaders are sceptical. "That poll was commissioned by the pro-nuclear lobby. We have polls of our own and they say something else," says one.

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10. Latin America warms up to nuclear expansion

By Sharon Squassoni
From the *Houston Chronicle* February 15th 2009.

Nuclear power, long on the outs, is fashionable again-this time as an antidote to energy insecurity and global climate change. In Latin America, the current plans for nuclear expansion are ambitious. Argentina and Brazil may seek to double or triple existing nuclear capacity. Mexico may build as many as eight more reactors by 2025. Chile, Venezuela and Uruguay are similarly caught up in the enthusiasm for nuclear energy.

With the exception of Mexico, interest in nuclear power around the hemisphere is driven by a desire to find alternatives to sometimes erratic hydroelectric power. Rising electricity demand and prices have also tightened natural gas supplies. Add to this the gas cutoff between Argentina and Chile and the nationalization of Bolivia's natural gas production in 2006 and the interest in nuclear power as a supplement to risky, tight gas supplies is suddenly growing.

Yet the road to nuclear power is long and expensive, and it is unclear whether it can live up to expectations.

Latin America's first nuclear power plant (Atucha I near Buenos Aires, Argentina) opened in 1974, 20 years after the world's first electricity-generating nuclear power plant. Since then, a lack of funds and public opposition after accidents at Three Mile Island in the United States (1979) and Chernobyl in Ukraine (1986) led to significant cutbacks in expansion plans. In the 1980s, Argentina and Brazil, then non-signatories to the Nuclear Non-Proliferation Treaty (both joined in the mid-1990s), also faced growing nuclear-trade restrictions for not signing on to the treaty. Both had been seeking foreign assistance to expand their expertise in sensitive uranium enrichment and spent fuel reprocessing - which can produce fuel for civilian reactors or for building nuclear weapons.

Today, there are just six nuclear power plants in Latin America - two each in Mexico, Argentina and Brazil. In Mexico and Brazil, nuclear energy supplies 4 percent of electricity generation; in Argentina, it supplies 7 percent.

Can an expansion of nuclear energy in Latin America reduce dependence on the energy produced by fossil fuels or hydropower as many of its advocates claim? In Mexico, the case is uncertain. Mexico's electricity demand is projected to grow 6 percent annually, far above the 2.6 percent global average and roughly on par with India and China. Mexico depends on oil and gas for 67 percent of its electricity generation. But oil production has been dwindling and gas prices are increasing, raising the need for Mexico to find new sources. Yet even if it builds the eight new reactors, it will only bring nuclear power up to 12 percent of electricity generation and do little to relieve the country's overwhelming dependence on oil and natural gas (a whopping 86 percent) for its total energy consumption. The reason: Nuclear power only produces electricity, whereas oil and natural gas are used for many purposes. What's more, it is questionable how quickly new reactors could be brought on-line. Mexico's first reactor, in Laguna Verde, took twenty years from initial bids to operation.

Like its regional neighbors Argentina also faces high electricity demand. Already anticipating a supply shortfall in 2010, most observers expect that the gap will increase considerably thereafter. And like Mexico, Argentina relies heavily on conventional fossil-fueled plants and hydroelectric power. According to the announcement in August 2006 by Planning Minister Julio de Vido, Buenos Aires will spend $3.5 billion to refurbish its larger reactor at Embalse (in Córdoba) and complete construction of a third reactor, Atucha II, by 2010. The country's am-

bitious plans to build five more reactors by 2023 could eventually double nuclear's share of electricity generation. But nuclear power will not solve Argentina's energy needs either. Hydroelectric capacity-of which only about 20 percent is used-will need to expand if the country is to meet its annual goal of 40,000 Megawatt electrical (MWe) generation by 2025.

Brazil, too, anticipates building a handful of reactors in the next two decades. Its national energy plan calls for four new nuclear power plants to be built by 2025. In the next 50 years, industry officials have reportedly suggested Brazil could reach 60 Gigawatt electric (GWe) of nuclear capacity. This would require building about 58 more plants-a tall order considering that construction on the next reactor, Angra-3, was delayed two years by environmental concerns. Brazil now relies on hydropower for 92 percent of its electricity production. The idea, according to Francisco Rondinelli, head of Brazil's nuclear association, would be to diversify at least 30 percent of electricity generation equally into nuclear energy, natural gas and biomass.

Three other Latin American countries may seek to diversify into nuclear power. Chile, which uses hydropower and imported natural gas, is considering nuclear to reduce supply vulnerabilities stemming from unpredictable rainfall and reliance on uncertain neighbors - namely Bolivia and Argentina. But the fact that most of Chile sits on a geological fault-line also presents a risk. Even if seismic concerns are somehow overcome, Chile will still face a daunting task in developing the necessary physical and intellectual infrastructure.

Venezuela and Uruguay are also interested in nuclear power but have much further to go. Venezuelan President Hugo Chávez has sought nuclear cooperation from Brazil, France, Iran, and Russia, but few suppliers appear to be biting, perhaps because Venezuela's plans are not well-defined.

Meanwhile, Uruguay, which gets virtually all its electricity from hydropower, has mentioned nuclear power as a future option, but national laws banning nuclear energy would need to be overturned. Moreover, its withdrawal of plans for a natural gas plant in 2005 because of the cost ($200 million) and time of construction (26 months) suggests that a nuclear power reactor, which costs upwards of $6 billion and takes at least four to five years to construct (in addition to the time required to obtain licenses and create the regulatory infrastructure), may not be in the cards.

Even without a spurt in nuclear power generation, the expansion of transmission grids between countries could be one potential solution to unpredictable energy supplies. The proposed Central American Electrical Interconnection System (SIEPAC) will connect 1,100 miles (1,770 kilometers) of transmission lines between Central American countries and Mexico. The extension of natural gas pipelines is also possible. And Brazil and Argentina have successfully covered shortfalls by selling each other electricity in off seasons.

Latin America is no exception to a global trend that sees nuclear energy as clean, green and homegrown. But like anywhere else, new nuclear power plants will require major political, financial and public support. The unknown variable now is the current economic crisis. Its anticipated dampening effect could provide breathing room to develop the needed intellectual and physical infrastructure required for nuclear power. Or, it could extinguish the nuclear enthusiasm that has been growing for the past few years.

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11. Vermont Senate Votes to Close Nuclear Plant

By MATTHEW L. WALD
The New York Times
Published: February 24, 2010

MONTPELIER, Vt. — In an unusual state foray into nuclear regulation, the Vermont Senate voted 26 to 4 Wednesday to block operation of the Vermont Yankee nuclear plant after 2012, citing radioactive leaks, misstatements in testimony by plant officials and other problems.

Unless the chamber reverses itself, it will be the first time in more than 20 years that the public or its representatives has decided to close a reactor.

The vote came just more than a week after President Obama declared a new era of rebirth for the nation's nuclear industry, announcing federal loan guarantees of $8.3 billion to assure the construction of a twin-reactor plant near Augusta, Ga.

While it is unclear how Vermont Yankee's fate could influence the future of nuclear power nationally, the reactor's recent troubles are viewed by some as a challenge to arguments that such plants are clean, well run and worth building.

Vermont's governor, Jim Douglas, a Republican, said after the Senate's vote that he and other governors had met with Mr. Obama on Monday and that Mr. Obama had spoken "passionately" about the need for more reactors.

"It's ironic that at the same time the president is advancing a strong commitment to nuclear energy, that we're taking a step in another direction here," said Mr. Douglas, who had sought to delay a vote until public outrage about several recent missteps at the plant cooled a bit.

In a small, ornate chamber packed with plant opponents, the Vermont senators voiced frustration over recent leaks of radioactive tritium at the 38-year-old plant as well as the collapse of a cooling tower in 2007 and inaccurate testimony by the plant's owner, the Louisiana-based nuclear operator Entergy.

Plant officials had testified under oath to two state panels that there were no buried pipes at Vermont Yankee that could leak tritium, although there were. No tritium has turned up in drinking water, but even plant supporters expressed dismay at the leak and the misstatements.

"If the board of directors and management of Entergy were thoroughly infiltrated by antinuclear activists, I do not think they could have done a better job of destroying their own case," said one senator, Randolph D. Brock III, a St. Albans Republican who cast several votes friendly to the plant.

In the hours of debate, one virtue of nuclear power emphasized by proponents at the national level — production of electricity without emissions of greenhouse gases — was hardly mentioned, even by supporters.

Entergy said in a statement after the vote, "We remain determined to prove our case to the legislature."

Under Vermont law, any extension of the plant's license beyond 2012 would have to be approved by both houses. Unless the Senate reverses itself and the House also approves an extension, the plant must close by March of that year.

All members of the House and the Senate are up for re-election in November, raising the possibility that a vote next year on the plant's fate could yield a different outcome. Democrats have large majorities in both chambers.

But the company faces a struggle in allaying the concerns of lawmakers and their constituents. In debate, senators cited estimates of over $1 billion for decommissioning the plant, although only about $450 million is on hand for the job. Tritium leaks could raise the bill, they said.

Before debate began Wednesday morning, Entergy said it had instructed a law firm to examine the misstatements its officials had made under oath and concluded that officials had not intended to deceive the state. It said communications had "led to misunderstandings," and a result was that "the responses were incomplete and misleading."

Curt L. Hébert, a spokesman for the company, said that Entergy had put five senior employees on administrative leave and that "all the discipline taken had financial consequences for the employees involved."

Mr. Hébert acknowledged in an interview that the leaks, the cooling tower collapse in 2007 and other problems had been "almost a perfect storm" for the plant.

On Wednesday, the chairman of the Nuclear Regulatory Commission said his agency would investigate the issue of the company's providing false information to the state.

The commission said the structure that collapsed, one of several cooling towers at the plant, was not required for the safe shutdown of the plant, but the distinction did little to buff the plant's image.

In a move that has also deepened public unease, Entergy has been trying to spin off the reactor and five others, including the Indian Point reactors in New York, into a new company that would borrow money to pay back Entergy and sell stock on Wall Street.

Many opponents in Vermont worry that this would allow Entergy, based in New Orleans, to avoid legal liability for any problems at the plants and that a spinoff could be detrimental to the state.

"It's a dump job," said Nancy Braus, a plant opponent from Putney who watched the Senate action from a corner of the chamber.

In theory, the debate here was over the plant's reliability, an area over which the state has jurisdiction. Over all, the plant has run far more days of the year under Entergy than under its former owners, a group of local utilities. National nuclear specialists like Entergy are often viewed as having more operating expertise than local utilities, but in many cases they lack local support.

In their culminating vote, senators defeated a resolution that would have authorized the state to issue a certificate of "public good," which would be necessary to keep Vermont Yankee operating.

Vermont got its foot in the nuclear regulatory door by getting Entergy to agree several years ago that its original certificate would expire when the original license did, in March 2012. A new certificate therefore requires approval by both houses.

Some plant supporters have raised the possibility of a lawsuit should the two houses decline to extend Vermont Yankee's operating license next year.

But Christopher M. Kilian, director of the Vermont office of the Conservation Law Foundation, said that because of the structure of the law requiring affirmative action of both houses for the plant to stay open, a suit would face difficult hurdles.

"There will not be an act of the legislature for anyone to challenge," Mr. Kilian said.

The controversy in Vermont is viewed with deep apprehension and some anger by the nuclear industry. The Nuclear Regulatory Commission in Washington, which normally makes the decisions on safety issues, is poised to give the plant 20 more years. Commission officials declined to comment on Vermont's action.

The last time a reactor in the United States was closed by a vote of the public or its representatives was in June 1989, when the voters of the Sacramento Municipal Utility District decided to shut the Rancho Seco reactor. The issues in that case were mostly economic; the plant kept breaking down, forcing the district to buy electricity from neighbors, and it had been shut from late 1985 to early 1988 for repairs.

Commissioned in August 1966 and given its operating license in March 1972, Vermont Yankee is one of the older plants in the American inventory of 104 power reactors. The oldest still running is Oyster Creek, near Toms River, N.J., which is of a similar design and opened in December 1969.

Oyster Creek recently won a 20-year extension of its initial 40-year license, although, to the anger of its opponents, plant owners announced a few days later that it, too, was leaking tritium.

12. Palomares: A forgotten accident?

Madrid adopts tougher tone on Palomares nuclear cleanup

Spanish government demands US assistance to deal with Almería bomb site

Rafael Méndez, *EL PAÍS*, - Madrid - 17/01/2011

The Spanish government is demanding that the United States address the cleanup of Palomares and the transfer of any remaining plutonium "without further ado." The request was filed on December 21 by the Foreign Ministry in response to a November 16 note from the US government declining any assistance at the present time.

The US Air Force accidentally dropped four nuclear bombs over this spot in Almería in 1966, when two of its planes collided in midair. Although the bombs did not go off, two of them released part of their charge, and 50,000 cubic meters of land remain contaminated with plutonium.

Spanish authorities last summer asked the US to take away the radioactive earth, since Spain lacks proper storage facilities. The cleanup would have an estimated cost of 31 million euros, and Madrid was expecting Washington to foot half of the bill, as well as provide technical assistance.

Last November, the US Embassy in Madrid confirmed that the government wanted further studies to be conducted in the area, prompting the December request from Madrid, which stresses that existing studies are enough to justify an immediate cleanup in order to allow residents to use the land.

13. Reactions to the nuclear accident in Japan, 2011

On 11 March 2011 an enormous earthquake (9 on the Richter scale) hit NorthEast Japan. It was followed by a violent tsunami.

"60 Minutes," a program of the United States television network CBS, aired a story on 20 March 2011: "Japan's Catastrophe". It is 15 minutes in length and you can see it at: cbsnews.com/video/60minutes.

Consult the material in the Reading Room under "Fukushima".

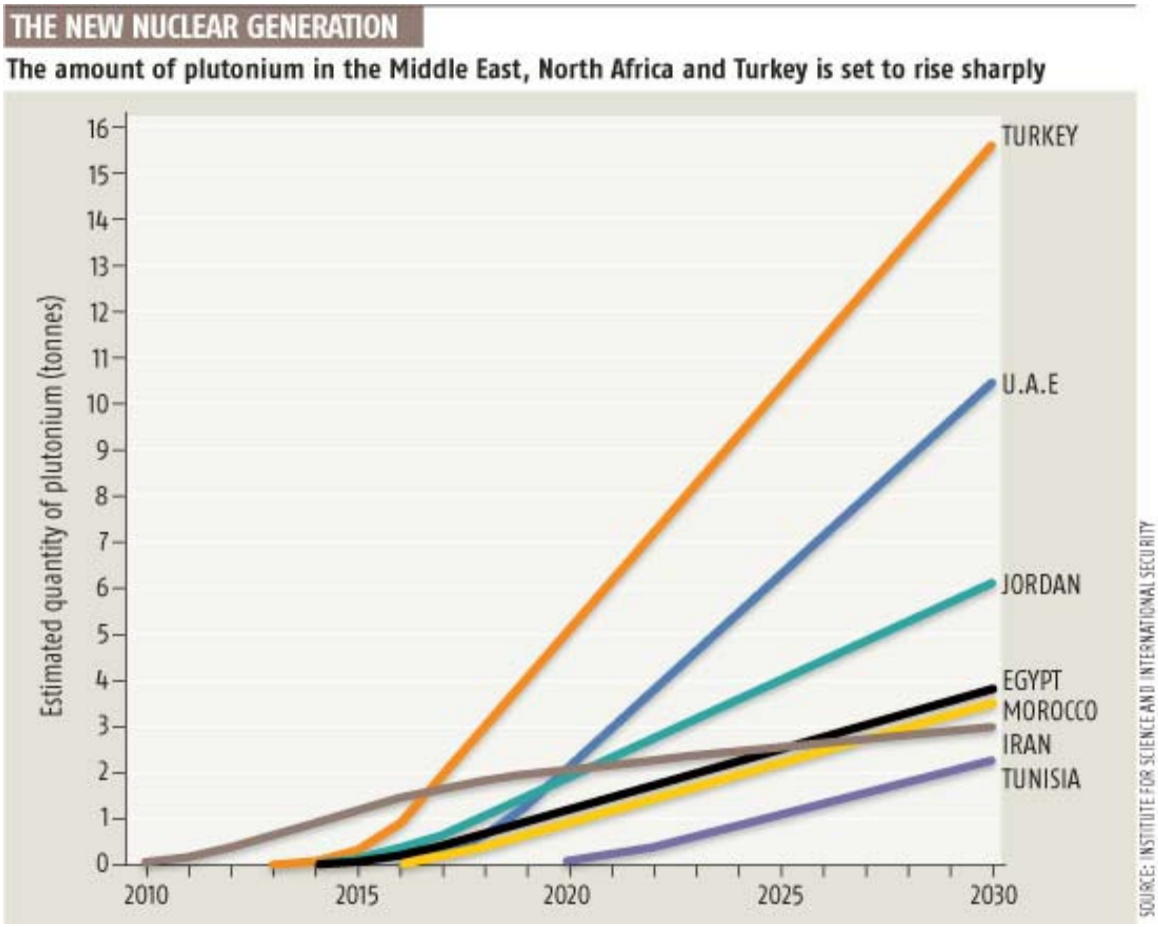
14. Should nuclear fuels be taken out of national hands?

by Debora Mackenzie

From *New Scientist* magazine, January 7th 2009, pages 6-7.

How do you manage a global boom in nuclear power while discouraging weapons proliferation? Uranium and plutonium are most likely to find their way into weapons via the enrichment and reprocessing of fuel for nuclear power plants. If all of the countries now planning to go nuclear also handle their own fuel cycles, the proliferation risk could skyrocket.

The answer may be to put the fuel cycle entirely under international control. Many governments, international agencies and arms control experts are calling for the establishment of international fuel banks, and eventually fuel production plants, that would pledge to supply nuclear materials to any country so long as it meets non-proliferation rules. The US already supports the idea, at least for new nuclear powers, and last month the European Union (EU) pledged €25 million towards the first fuel bank. Yet this means countries with new nuclear programmes would have to place control of their fuel supply at least partly in foreign hands. Could it actually work?



Last year saw fresh predictions of the proliferation of nuclear weapons, especially in the politically explosive Middle East. The most critical situation is Iran, which has rejected international demands to stop enriching uranium. In a reportreleased last month, the International Atomic Energy Agency (IAEA) warned that Iran's uranium enrichment is expanding, and the agency could not exclude military use. Analysts at the Institute for Science and International

Security in Washington DC, an anti-proliferation think tank, say the country could have enough for a nuclear weaponthis year. With some nations in the region already nuclear, neighbouring countries could feel pressure to follow suit (see "Nuclear Middle East"). At the same time, many are looking to acquire their own nuclear industries, meaning there will soon be far more weapons-grade material around (see graph).

For most nuclear newcomers in the region and elsewhere, the move to nuclear power is largely independent of military concerns. Nuclear power capacity worldwide could almost double by 2030, says Vilmos Cserveny, head of external relations at the IAEA, mainly because poor countries face climbing oil prices and crippling electricity shortages. The problem is that countries that may not have the infrastructure needed to enforce stringent controls will be managing nuclear materials for the first time. Of the nuclear power plants now under construction, says Cserveny, around half are in developing countries, especially in Asia (see box).

The world does not need more enrichment plants to fuel this expansion; there are plenty, especially in Russia. Of the 30 countries already with nuclear power, only 14 enrich their own fuel - the rest buy it in. However, some countries may be wary of depending on foreign powers for their energy and might want to make and reprocess their own fuel. Every new fuel plant increases the risk that fissile material will find its way into weapons, so the challenge is to find ways to guarantee fuel supplies without countries building their own facilities, says Cserveny.

According to a growing number of analysts, agencies and governments, the solution is internationally managed reprocessing plants. The idea was first proposed in 1946, but no plan has ever been agreed on. In 2003, though, it resurfaced when IAEA chief Mohammed El-Baradei began promoting so-called multilateral nuclear arrangements (MNAs).In recent months, interest from countries that already have nuclear power has increased steeply. "Multilateral mechanisms should offer a real alternative to countries to forego developing

Nuclear middle east

Iran isn't the only Middle Eastern nation that has observers worried about nuclear proliferation. Nine other countries in the region plan to build around 12 nuclear power plants over the next decade. This will produce enough plutonium in spent fuel for 1700 nuclear weapons, says David Albright of the Institute for Science and International Security in Washington DC, an anti-proliferation think tank. With nuclear weapons already in Israel, Pakistan, India and potentially Iran, there is motivation to acquire them.

If the newcomers acquire fuel production and reprocessing facilities then the risk of material finding its way into weapons will rise sharply. Inspections might prevent this, but only eight countries in the region - including Iran - have signed the International Atomic Energy Agency's most stringent inspections agreement, known as the Additional Protocol. Only four countries enforce it. Egypt says it will never sign. Both it and Turkey reject a proposed moratoriumon enrichment and reprocessing in the region put forward by, among others, Sweden's Weapons of Mass Destruction Commission.

Meanwhile, Gulf states have decided it makes business sense to sell their ever-scarcer oil and buy nuclear power for themselves. In December, the US agreed to sell a nuclear reactor to the United Arab Emirates. Both sides say the UAE will forego enrichment and sign the protocol. Yet it's unclear whether the signed deal stipulates this, says Henry Sokolski, who serves on the US Congress's anti-proliferation commission.

their own national enrichment and reprocessing capabilities," Javier Solana, EU high representative, said in Brussels in December.

In a first step towards MNAs, the EU last month granted €25 million towards the creation of an IAEA emergency nuclear fuel stockpile that any country can tap should its commercial supply be cut off due to political disputes. It's not the only proposal to ensure an international fuel supply. In a report for the European Parliament published in December, Ian Anthony of the Stockholm International Peace Research Institute (SIPRI) documents nine separate proposals from experts and governments. Along with the IAEA fuel bank, there are four for putting existing enrichment plants under international control and four more to build new, supersafe enrichment plants that would be international from the start.

Newcomers to nuclear power could be reluctant to put their fuel cycles in international hands if existing nuclear powers, such as the US, Russia and the UK, continue to control their own. Several proposals call for every nuclear country to join in.

In fact, long-standing resentments over the rich world's monopolisation of nuclear technology have made developing countries wary of any effort to ask them to rely on the nuclear powers for their energy security, says Oliver Meier of the Arms Control Association, a think tank based in Washington DC. Why would they place themselves at the mercy of foreigners for their energy? "Partly because it is very expensive to make and reprocess nuclear fuel," Meier suggests. Spiralling costs are already leading to consolidation in the nuclear fuel industry, so a multilateral future may not be so unlikely, says Anthony. And for nations like Egypt and Iran, for example, a shared fuel source and stringent inspections would mean each could be sure that the other is not quietly proliferating — at least in theory.

To further assuage concerns over shared fuel, Germany has suggested that some countries should cede sovereignty over a piece of territory where fuel cycle companies could build facilities that would then be run by the IAEA. It could even be at Natanz, Iran's enrichment plant, says Meier. This might seem unpalatable to some western governments, but "the alternative, Iran going it alone without inspections, is worse", he says.

Some countries could cede sovereignty over a piece of territory where internationally run facilities could be built

Geoffrey Forden of the Massachusetts Institute of Technology thinks that Iran should set up a commercial partnership with western and regional governments to put Natanz under joint control. Iran would have to promise not to enrich anywhere else, and accept inspections; the IAEA-operated plant would then make enough fuel for Iranian reactors and those in the rest of the region. Staff would be multinational and chances for subterfuge would be limited. "The plan meets the bottom line on both sides," he says.

15. Pakistan Frees Nuclear Dealer in Snub to U.S.

By Salman Masood And David E. Sanger
From *The New York Times* February 6th 2009.

ISLAMABAD, Pakistan — A Pakistani court freed one of the most successful nuclear proliferators in history, Abdul Qadeer Khan, from house arrest on Friday, lifting the restrictions imposed on him since 2004 when he publicly confessed to running an illicit nuclear network.

Mr. Khan, 73, considered in the West as a rogue scientist and a pariah who sold technology to North Korea, Libya and Iran, is revered as a national hero in Pakistan for his role in transforming the country into a nuclear power.

The ruling to set him free seemed as much a political decision as a legal one, intended to shore up support for the government of President Asif Ali Zardari, which has been derided in the Pakistani press as being too close to the United States. The government has been under intense domestic pressure to free Mr. Khan, and that outweighed the backlash that Mr. Zardari knew the action would cause in Washington.

Issued by a court of limited jurisdiction set up under the previous government, the decision came just days before the Obama administration's special envoy to the region, Richard C. Holbrook, was scheduled to visit Islamabad. The Pakistani Foreign Ministry said, "The so-called A. Q. Khan affair is a closed chapter."

Mr. Khan, taking to reporters after the ruling, credited the new civilian government of Pakistan for arranging the deal that won his freedom and said "I don't damn care" about the international reaction to his release.

In Washington, officials condemned the move. While it is almost inconceivable that Mr. Khan would again be actively involved in Pakistan's nuclear program, which has created an arsenal of roughly 100 weapons, there was broad concern that he could reactivate an international black-market network that was only partly dismantled.

"He's still a proliferation threat," said Robert A. Wood, the spokesman for the State Department. "We're very troubled by this."

President Obama's spokesman, Robert Gibbs, said the United States wanted assurances from Pakistan that the onetime metallurgist would never be able to sell nuclear expertise or equipment again.

But neither the State Department nor the White House would say whether Mr. Obama was prepared to reverse the Bush administration's position and demand that Pakistan allow international nuclear inspectors and the Central Intelligence Agency to interview Mr. Khan about his activities over the past 20 years.

Those investigators, repeatedly rebuffed by Pakistani officials, who insisted on taking questions in writing and only selectively passing back answers from Mr. Khan, have many questions outstanding. Chief among them is whether he sold uranium enrichment equipment to other countries that he visited as he sold Pakistani nuclear technology from the late 1980s until his detention in early 2004. Of particular alarm is relatively new evidence that computers seized from his network had upward of three different designs for a nuclear weapon, some of Chinese origin and others with substantial modifications made by Pakistan for its own nuclear arsenal.

"The key question," one senior Bush administration official said in an interview last year, "is whether he gave one of his designs to the Iranians," a possibility that could significantly shorten the amount of time it would take Iran to produce a weapon.

The ruling was accompanied by a secret agreement between Mr. Khan and the civilian government, the contents of which were not disclosed, which may continue to place restrictions on him. It was not entirely clear whether Mr. Khan would be free to leave the country. Nor was it clear how his new freedom would make Mr. Khan any more of a threat than his loose house arrest.

Washington's concerns were defiantly dismissed by Mr. Khan, who, beaming and smiling, was thronged by supporters and television cameras outside his residence in an affluent neighborhood upon news of his release.

"Let them talk," he said. "Are they happy with our God? Are they happy with our prophet? Are they happy with our leaders? Never, so why should we bother what they say about us?"

Mr. Khan added, "I would be more worried about what you say about me, not what Bush says or what Dick Cheney says."

Over the years, Pakistani officials have been concerned that Mr. Khan might implicate others — in the civilian government, the military or the intelligence agencies — as accomplices in the highly profitable network.

But Mr. Khan also made clear that the decision would not have been made without the support of the Zardari government, with which the Obama administration hopes to build a more productive relationship as it seeks to fight the Taliban and Qaeda networks in Pakistan. "All this happened because of the keen interest taken by the president, the prime minister and especially Rehman Malik, who has looked into the case, reviewed it, discussed it with the government, discussed it with the concerned authorities," Mr. Khan said. Mr. Malik is the senior official in the Pakistani Interior Ministry.

The lifting of restrictions served to pacify the powerful conservative lobby in Pakistan that wanted greater freedoms for Mr. Khan, according to Talat Masood, a retired Pakistani Army general. "This has taken away pressure on the government," Mr. Masood said.

"The government will go out of its way to assure the international community and the United States in particular that he will devote most of his time to education and do nothing on nuclear matters," Mr. Masood added. "That's very important for Pakistan's credibility."

Other analysts agreed. "A. Q. Khan's release is a good symbolic move that is likely to restore faith in the civilian government's bid to sustain its sovereignty," said Rafia Zakaria, a columnist for The Daily Times, a leading English newspaper in Pakistan. "Something which is essential if Pakistanis are to believe that the war on terror is not just being fought at America's behest and is something in their own interest."

In the most recent investigations, the Khan network was found to have trafficked in a tested, compact and efficient bomb design that could significantly shorten the time needed to build a weapon and could be delivered by many existing missiles, like the Shahab-3 in Iran. But in the interviews with local television networks outside his residence, Mr. Khan said his 2004 confession to involvement in proliferation was a "matter of the past."

The lawyer for Mr. Khan, Ali Zafar, said the court ruled that he was a "free citizen" entitled to fundamental rights. The decision, according to Mr. Zafar, said that Mr. Khan was not involved in criminal or proliferation activities and hence his confinement to house arrest was illegal. The former president, Pervez Musharraf, had pardoned Mr. Khan.

The ruling also said that Mr. Khan would be given full protection by the state, the details of which were outlined in a secret document, Mr. Zafar said. Pakistani news reports said the implications of the agreement that prompted the court ruling were unclear.

Mr. Masood said one of the reasons it was unlikely Mr. Khan would travel abroad was because of the threat of abduction by people who wanted his information. According to Pakistani press reports, under the court ruling Mr. Khan must give 48 hours' notice if he wants to leave Islamabad.

The Zardari government had already eased some of the restrictions placed on Mr. Khan by the house arrest order of the Musharraf era. For example, he was allowed to eat at restaurants, and wrote newspaper articles.

Last month, the United States State Department announced sanctions on 13 people, including Mr. Khan, and three private companies that the United States said were involved in the Khan nuclear proliferation network.

In its announcement, the State Department specified that Mr. Khan and his associates provided Iran and Libya with centrifuge components, designs and, in some cases, complete centrifuges. According to the statement, the United States also believed that Mr. Khan and his associates provided centrifuge designs, equipment and technology to North Korea, though the intelligence agencies have backed away from allegations several years ago that the North used those to build secret facilities.

Salman Masood reported from Islamabad, and David E. Sanger from Washington. Jane Perlez contributed reporting.

16. The proliferation business

Unstoppable?
The illicit nuclear trade flourishes because governments let it
Mar 11th 2010 | From *The Economist* print edition

Peddling Peril: How the Secret Nuclear Trade Arms America's Enemies. By David Albright. *Free press; 304 pages; $27.*

EVER since the atom was split, governments have struggled to control a force with potential for good that can also wreak awful destruction. Some argue it is impossible to stop technologies that can keep the lights on from being used to make bombs. That is a sobering thought in a world ready to re-embrace relatively carbon-free nuclear power. But David Albright, a respected chronicler of undercover nuclear shenanigans, tells a more alarming story: just how little most governments have done to halt the bomb's spread.

In the 1960s John Kennedy fretted that without a test ban and other hurdles, eventually a score of countries could have their finger on a nuclear trigger. So far, the tally of serious nuclear dabblers, past and present, stands at about 30. Only ten have succeeded, but some are still trying.

After America, Russia, Britain, France and China, recognised as nuclear powers by the Nuclear Non-Proliferation Treaty (NPT) because they had already tested their bombs, came India and Pakistan, which like North Korea boast of their prowess. Israel is coy. Most successfully secretive was South Africa. It stunned the world in 1993, announcing it had covertly built six nuclear devices and then dismantled them. Others thought better of it, had arms twisted by America or, like Iraq and Libya, were caught radioactive-handed.

Yet others cheat on. Iran and Syria, though members of the NPT, are stonewalling inspectors from the International Atomic Energy Agency, the UN's nuclear guardian, over mounting evidence of clandestine nuclear work. Secretive Myanmar may also be up to no nuclear good.

Mr Albright explains how such latecomers got their start in the nuclear business. This was often, though not always, with designs and materials supplied by the global nuclear smuggling network run by Abdul Qadeer Khan, a Pakistani former nuclear scientist. Plans for a uranium-

enrichment plant in Libya were so detailed they had instructions for where to put toilet-paper holders in the bathrooms.

But the book's real value is in pulling two clear threads from the facts and speculation. One is that commerce almost always trumps proliferation concerns, and not just among Mr Khan's band of merry smugglers. Profits can be huge and catching traffickers hard. In Germany and Switzerland, where sales of precision machine tools, valves and much else of nuclear use were a source of national pride, export licences used to be waved through. But Mr Albright also tells the story of a German company, Leybold AG, previously up to its armpits in dodgy dealings, that chose instead to turn market leader in spotting attempts to smuggle parts for weapons even when cleverly disguised as orders for innocent-seeming widgets. It can be done.

The other thread is China. Despite a raft of laws and sporadic enforcement, its ports and companies are still key links in the illicit export/import chains of North Korea, Iran and others. What is more, in the early 1980s China gave Pakistan a pre-tested design of a missile-mountable warhead.

This single wanton act probably did the most to undermine the global non-proliferation regime. Mr Khan later sold the design (his network also had more sophisticated ones) to Libya, very likely Iran and North Korea, and possibly others. China's leaders have also held out longest over tougher sanctions on Iran, whose nuclear programme has benefited from their past irresponsibility.

17. Leonardo Mascheroni

A. Couple Accused of Passing Nuclear Arms Secrets

By WILLIAM J. BROAD

The New York Times, September 17, 2010

A physicist and his wife, who both once worked at the Los Alamos National Laboratory in New Mexico, were arrested Friday and charged with a criminal conspiracy to help Venezuela build an atom bomb.

The arrests of P. Leonardo Mascheroni and Marjorie Roxby Mascheroni and a 22-count indictment came after a sting operation by the Federal Bureau of Investigation from 2008 to 2009. A raid on the couple's home in Los Alamos last October hauled away cameras, computers and hundreds of files.

"If I were a real spy," Dr. Mascheroni told a reporter at the time, declaring his innocence, "I would have left the country a long time ago."

After their arrests on Friday, the couple appeared in federal court in Albuquerque. They were charged with handing over secret weapons information to an F.B.I. agent posing as a Venezuelan spy. The government did not accuse the Venezuelan government, or anyone working for it, of seeking weapons secrets.

Venezuela has begun exploring for uranium, but its president, Hugo Chávez, has denied interest in developing nuclear arms.

The defendants, if convicted of all the charges, face potential life sentences in prison. Dr. Mascheroni worked for Los Alamos, the nuclear laboratory, from 1979 to 1988, and his wife from 1981 until the raid on their home last year.

Dr. Mascheroni has long criticized the government's nuclear policies as misguided and has repeatedly accused federal agents of harassing him for his views.

"Leo is a gullible nut," said Hugh E. DeWitt, a California physicist, in a telephone interview on Friday. He knows Dr. Mascheroni and had testified before a grand jury. "He is a nut, but he has dug his own grave," Dr. DeWitt said.

The indictment says that Dr. Mascheroni, 75, a naturalized citizen from Argentina, and Ms. Mascheroni, 67, an American citizen, handed over weapons secrets in exchange for $20,000 in cash and the promise of nearly $800,000 in all.

"The conduct alleged in this indictment is serious and should serve as a warning to anyone who would consider compromising our nation's nuclear secrets for profit," David Kris, the assistant attorney general for national security, said in a statement.

According to the indictment, Dr. Mascheroni told an undercover agent in March 2008, that he could help Venezuela develop a nuclear bomb within 10 years and that under his program, the country would use a secret, underground nuclear reactor to make plutonium, a type of bomb fuel.

In July of that year, the F.B.I. agent provided Dr. Mascheroni with 12 questions supposedly from Venezuelan military and scientific personnel.

According to the charges, the physicist delivered to a post office box that November a computer disk holding a 132-page document, written in code, that contained "restricted data" related to nuclear weapons.

Written by Dr. Mascheroni and edited by his wife, the document was titled "A Deterrence Program for Venezuela," and officials say it laid out the physicist's weapons plan for Venezuela.

Dr. Mascheroni stated that the information he was providing was worth millions of dollars, but that his fee for producing the document was a mere $793,000, according to the indictment.

Earlier in the sting operation, the authorities say, Dr. Mascheroni asked the F.B.I. agent about obtaining Venezuelan citizenship. In June 2009, Dr. Mascheroni received from the box another list of questions, supposedly from Venezuelan officials, and $20,000 in cash as a first payment.

On his way to pick up these materials, according to the indictment, he told his wife he was doing the transaction for the money and was no longer an American.

B. Zeal for Dream Drove Scientist in Secrets Case

By WILLIAM J. BROAD

The New York Times, September 27, 2010

Many people who know P. Leonardo Mascheroni describe him as a maverick and a technology zealot. Now, the Justice Department will try to prove that he is dangerous, too — a man willing to sell atomic secrets in exchange for a chance to realize his dream.

Dr. Mascheroni, 75, is a nuclear scientist who has spent the 22 years since he left the Los Alamos National Laboratory trying to sell Congress, the scientific community, journalists — anyone who would listen, really, including this reporter — on his plan to build a giant laser for the achievement of nuclear fusion.

His plan earned respect and high-level endorsements, but the government chose a different path. Rather than give up, Dr. Mascheroni redoubled his campaign, sending out lengthy technical documents from his home in New Mexico to try to coax Washington to finance his laser.

"You'd get these fat FedEx packages," said Steven Aftergood, a security expert at the Federation of American Scientists.

As he was snubbed by Congress and federal experts, Dr. Mascheroni, a naturalized citizen who was born in Argentina, grew increasingly frustrated and bitter. He became known in Washington for veiled threats to take his atomic expertise abroad unless the government backed his laser plan. He seemed to think that he could bully the federal establishment into big spending, according to people on the receiving end of his missives.

"He came at you like a force of nature," recalled Matthew G. McKinzie, a former Los Alamos researcher who is now at the Natural Resources Defense Council, a private group in Washington. "He and his coterie of followers at Los Alamos believed his approach could provide a source of limitless, clean energy for humanity."

A 22-count indictment against Dr. Mascheroni, made public on Sept. 17, quotes his wife, Marjorie, as saying that he would "make bombs" overseas "if they don't listen to him in Washington." She has been charged as a co-conspirator, and both of them have pleaded not guilty.

Dr. Mascheroni's world began to crumble last October, when federal agents raided his home in Los Alamos, hauling away his computers and hundreds of paper files. When reached by phone, he said at the time that he was suspected of treason.

Clearly rattled, Dr. Mascheroni declared his innocence. He defended his actions, including his interactions with the man who had represented himself as a Venezuelan contact but who Dr. Mascheroni by then suspected — correctly — was actually an informant for the Federal Bureau of Investigation.

"It was a way of getting attention in Congress" and trying to prompt hearings on Capitol Hill about the nation's fusion program, he said of his decision to talk with the would-be foreigner.

"I told them, 'If you don't have hearings, I'm going to leave,' " he said. "And they didn't have hearings."

Dr. Mascheroni conceded that the man had promised him a lot of money, but insisted that he wanted it simply "to make a big case. It was political leverage. That's the bottom line."

"If I were a real spy, I would have left the country a long time ago," he added.

Federal prosecutors have charged Dr. Mascheroni with trying to sell nuclear secrets to Venezuela as part of a complicated scheme to have that country bring his laser to life. According to the indictment, he negotiated the deal in 2008 and 2009 with the undercover F.B.I. agent, who paid him $20,000 out of an overall promise of nearly $800,000.

The laser that Dr. Mascheroni wants to build could provide — in theory — an unusual but potentially limitless source of energy for the world, and in particular for the United States, his adopted home.

In the October phone interview, Dr. Mascheroni drew parallels between his own idealism and that of J. Robert Oppenheimer, who led the Los Alamos team that built the world's first atom bomb but later tried to slow the arms race.

"I have to put my science at a higher level," he said, emphasizing that his responsibilities to the scientific truth extended beyond duties to care for his family. He suggested that he even might face a death sentence.

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The couple have a son, who is a firefighter in Idaho, and a daughter, who is a lawyer in California. Mrs. Mascheroni lost her job at Los Alamos the day of the federal raid, and neither she nor her husband has agreed to an interview since they were indicted.

Dr. Mascheroni, who is known as Leo, was trained at a physicist at the University of California, Berkeley. At Los Alamos, he was exposed to information on nuclear arms and worked on teams that sought to make energy advances.

In 1988, after nine years at the weapons lab, he left and embarked on a personal crusade to achieve what had eluded thousands of other scientists: a controlled version of nuclear fusion, the violent process that powers the Sun, the stars and hydrogen bombs. His proposal — the use of a big laser — was considered among the most futuristic of the alternatives on the table.

Skeptical of federal plans for laser fusion, he promoted his own as cheaper, faster and far more likely to succeed. Its wavelength was much longer, and its blasts of concentrated light far easier to achieve. He dismissed resistance to his plan as an overzealous commitment to the status quo.

"It's a cultural thing," he told The New York Times in 1988. "They don't want to admit something different."

He won guarded approval. A Los Alamos panel led by Gregory H. Canavan, a respected senior scientist, found Dr. Mascheroni's idea worth exploring. The main attraction, the panel said, was that his laser system might prove to be as little as one-twentieth the cost of its rivals.

"It's very important for our country to have this option for the future," Dr. Mascheroni said in a 1989 interview. "The other approaches are not going to work."

After leaving the weapons lab, Dr. Mascheroni toiled on his pet project without pay, relying on his wife to provide most of the family's income. Her jobs at Los Alamos included technical writing and editing.

Dr. Mascheroni, meanwhile, persistently lobbied the Capitol for his laser plan. In 2003, for example, he wrote to Senator John McCain, Republican of Arizona, who had just become chairman of the Senate Commerce Committee. The letter was 319 pages long, and Dr. Mascheroni sent copies to relevant experts outside of Congress.

Despite his rebel status and impolitic ways, he was often taken seriously. He won the backing of a former Central Intelligence Agency director, R. James Woolsey, who helped him promote his vision. Ultimately, however, the nation chose a more elaborate laser path.

That did not stop Dr. Mascheroni. The indictment against him describes clandestine meetings, tape-recorded conversations, confidential places for the transfer of documents and a pattern of false statements from Dr. Mascheroni and his wife to federal authorities.

As part of the plot, prosecutors say, Dr. Mascheroni would build a laser for producing energy — as he had always wanted to — and would throw in a plan for Venezuela that "could deliver a nuclear bomb in 10 years."

Lawyers in the case say that a trial may not get started until the middle of next year. If found guilty, Dr. Mascheroni and his wife could face up to life in prison.

As Dr. Mascheroni sits in a halfway house in Albuquerque awaiting trial, the rival laser that he criticized for so many years now looms over a small California town. The size of a football stadium, the $3.5 billion site is known as the National Ignition Facility. It is the world's most powerful assemblage of lasers, their concentrated light like a tiny star. The 192 lasers fire in unison on flecks of hydrogen fuel smaller than a match head.

Skeptics dismiss the facility as a colossal delusion that is squandering precious resources — $140 million a year — at a time of economic hardship. But scientists at the Lawrence Livermore National Laboratory, its home, insist that the laser is making great progress toward its goal.

Hugh E. DeWitt, a California physicist and veteran of the Livermore lab, suggested that Dr. Mascheroni, in approaching a man he thought was a Venezuelan agent, was probably overselling his bomb skills in an last-ditch attempt to bring his laser to life.

"He was never particularly interested in nuclear weapons," recalled Dr. DeWitt, who attended Dr. Mascheroni's wedding. "His interest was in laser fusion."

But Dr. Mascheroni's fixation on the giant laser transformed him into "a gullible nut," one who readily stumbled into the F.B.I.'s trap, Dr. DeWitt said, adding: "He has dug his own grave."

18. So Let's Say Iran Gets the Bomb...

By DAVID E. SANGER
Published: March 12, 2010

For a few months in the mid-1960s President Johnson and his aides secretly weighed bombing China's nuclear sites — perhaps seeking Soviet help — rather than let Mao get the bomb. Then the costs of starting another war in Asia sank in and they decided to try containment — living with a threatening regime while deterring its most dangerous moves.

It worked. Nearly five decades later, more Americans wake up worried about our trillion-dollar debt to China than about China's arsenal. China has evolved into a comparatively manageable military competitor, at least for now.

Today a version of the same debate about whether containment is the answer is breaking out again, this time about Iran. Prominent strategists like Zbigniew Brzezinski argue forcefully that what worked in the cold war will work with the mullahs. The cover of Foreign Affairs this month is an article titled "After Iran Gets the Bomb"; it draws scenarios for dealing with what many believe is inevitable. Meanwhile, the administration races to add antimissile systems and a naval presence in the Gulf — an effort to contain Iran's power in the region, officials say, but it sure looks like the building blocks of a nuclear containment policy, a backup in case the next round of sanctions fails to do the trick.

The White House denies that nuclear containment is on the table. "The United States is determined to prevent Iran from acquiring nuclear weapons, period," Vice President Joseph R. Biden Jr. said on his testy trip to Israel last week.

But to many in the early 1960s, a nuclear China was also unthinkable. More recently, George W. Bush would regularly repeat that America would never "tolerate" a nuclear North Korea. The reality was that during the last six years of his presidency, he tolerated it, then prepared the way for the current containment strategy of intercepting shipments from North Korea to customers for its nuclear know-how.

What is striking about the current debate about containing Iran is that neither side seems entirely confident in the solidity of its argument.

Those who advocate sanctions acknowledge that three rounds enacted by the United Nations Security Council failed to change Iran's behavior. Even if the administration wins new sanc-

tions aimed at the Revolutionary Guard, the advocates admit it will still be a long shot that Iran would hurt enough to stop enriching uranium.

Those who argue that a military strike might be needed if sanctions fail have their own doubts. They admit they cannot predict Iran's response — from terror strikes to oil cutoffs to confrontations in the Strait of Hormuz.

Even the administration seems tentative about when Iran will exceed American tolerance. In the Pentagon and the intelligence agencies, several senior officials complain — though never on the record — that President Obama and his staff have not clearly defined when Iran will gain a "nuclear weapons capability." Many argue that similar indecision preceded the day in 2006 when Mr. Bush woke up to discover that North Korea had conducted a nuclear test.

So what is the argument for containment? Basically, it assumes that if China and Russia changed over decades, so might Iran. And nuclear weapons can handcuff a nation as easily as they can empower it. Last week, at the University of Oklahoma, Mr. Brzezinski argued that either an Iranian bomb or an attack on Iran would be "a calamity, a disaster." He said containment could work because Iran "may be dangerous, assertive and duplicitous, but there is nothing in their history to suggest they are suicidal."

Nevertheless, in their Foreign Affairs essay, James Lindsay and Ray Takeyh concede that the Iran case differs substantially from the cold war ones, and that a successful strategy today would have to recognize that fact. They urge Mr. Obama to prescribe three explicit no-go zones for the Iranians: "no initiation of conventional warfare" against another nation; "no transfer of nuclear weapons, materials, or technologies"; no increase in support for terrorists. The penalty, they argued, would have to include "military retaliation by any and all means necessary," including the use of nuclear weapons.

It is a logical list. But there is a counterargument: Why would Iran believe the threat if the United States, having said it would never allow Iran to get a nuclear capability, then allowed it?

In fact, the administration is deep into containment now — though it insists its increases in defensive power in the Gulf are meant to deter a conventional attack by Iran. If Iran's threat went nuclear, America might have to extend its nuclear umbrella as well. Defense Secretary Robert Gates carefully stepped around that option last week while in Saudi Arabia and the United Arab Emirates, trying to reassure leaders who increasingly fear the prospect of an Iranian bomb.

Mr. Gates defended the sanctions strategy: "I think the prospects of success are certainly better than in a lot of other situations where sanctions have been applied," he said. But he spent most of his time explaining the need for "defensive capabilities" against Iranian missiles.

Few doubt the missile threat can be contained. Strategists worry more that Iran might slip a crude weapon or nuclear material to terrorists, betting it couldn't be traced back to Tehran. (It's not a bad bet — the science of "nuclear attribution" is a lot weaker than it seems on "24.")

Yet another argument against containment comes from Brent Scowcroft, the national security adviser under Presidents Gerald Ford and George H. W. Bush. "The ultimate consequence of trying to contain Iran has little to do with Iran itself," he argues. "The biggest risk is that it will start an eruption of proliferation" around the Gulf, starting with Turkey, Saudi Arabia and Egypt. They would doubt the American deterrent capability, he said, and the problem would spread to Japan and South Korea.

A version of this article appeared in print on March 14, 2010, on page WK3 of the New York edition.

19. French and British Nuclear Submarines Collide

By John F. Burns
From *The New York Times* February 16th 2009.

LONDON — A potentially catastrophic incident involving two nuclear submarines, one French and the other British, was narrowly averted earlier this month when the two boats collided in mid-Atlantic, reports in the British and French news media said on Monday, quoting sources in the two defense ministries. Both submarines were damaged extensively but have returned to their home ports since the collision on the night of February 3, the reports said.

The French vessel, Le Triomphant, was said to have suffered severe damage to its sonar dome, housing equipment crucial to navigation and tracking of other ships. The British craft, H.M.S. Vanguard, was towed back to its home port at Faslane in Scotland with "very visible dents and scrapes," the BBC reported.

The two submarines are at the core of their countries' nuclear forces, each carrying a battery of intercontinental ballistic missiles equipped with multiple warheads. None of the media reports suggested there had been any risk of the collision accidentally triggering the missiles, which can be launched only after complex procedures designed to make the missiles fail-safe in the event of accidents.

But what little is known about the collision suggests that the two vessels were fortunate to have avoided a more serious outcome, including sinking. Although defense officials in London and Paris gave no indication of where the collision occurred, the fact that it took Le Triomphant three days to limp back to its home port after the collision, a detail disclosed by French officials, suggested the two craft had been far out at sea.

French officials quoted in The Daily Telegraph, a British newspaper, played down the incident. "The collision did not result in injuries among the crew and did not jeopardize nuclear security at any moment," one official was quoted as saying. But he also said that the crew of 101 sailors "neither saw nor heard anything" before the impact, indicating a failure in the submarine's systems for tracking other vessels.

The British Defense Ministry refused to comment on the collision, though its statement implicitly confirmed that there had been an incident at sea. "It is MOD policy not to comment on submarine operational matters, but we can confirm that the U.K.'s deterrent capability has remained unaffected at all times and that there has been no compromise to nuclear safety," a ministry spokesman said.

Defense experts said that one possible explanation for the collision was that the two submarines were involved in an exercise that involved the craft tracking each other at close quarters in the kind of war games that have played out in the Atlantic for decades between western and Soviet submarines, especially in the northern Atlantic between Scotland and Iceland.

A sense of what is involved in these games of deep-sea maneuver was given in the 1990 film, "The Hunt for Red October." Based on a novel by Tom Clancy, the film centers on a chase involving an American hunter-killer submarine, the U.S.S. Dallas, and a Soviet missile-carrying submarine, the Red October. In its tensest moments, the film shows the two submarines, each using sophisticated technology designed to avoid sonar detection, maneuvering at close quarters in a deep-sea canyon off Iceland.

Britain and France each have four missile-carrying nuclear submarines, constituting the core of their nuclear arsenals. According to military journals, Le Triomphant carries 16 ballistic

missiles with a range of 5,000 miles, each with six warheads. H.M.S. Vanguard is a Trident-class submarine, 492 feet long and weighing 16,000 ton. It, too, carries 16 missiles, each with three nuclear warheads.

For Britain, the collision was the latest in a series of mishaps that have dogged its nuclear submarine fleet, and added to calls for the replacement of the Trident-class over the next 20 years. Last week, an inquest in the northern city of Sunderland heard how the explosion of an oxygen generator aboard another British nuclear submarine, H.M.S. Tireless, killed two sailors in March 2007 when the submarine was 200 miles off the Alaskan coast beneath the Arctic icecap.

A Royal Navy inquiry into the explosion said "systematic failings" in the oxygen-generating system, which had caused seven incidents aboard British nuclear submarines in the 14 months before the explosion, were probably to blame for the explosion. H.M.S. Tireless, belonging to the Trafalgar class of submarines, is a so-called "hunter-killer" vessel, designed to track down other submarines, and does not carry ballistic missiles.

20. Majority Supports Use of Atomic Bomb on Japan in WWII

August 5, 2005

Say bombing saved American lives by shortening the war, but divided on whether it saved Japanese lives

by David W. Moore, **GALLUP NEWS SERVICE**

PRINCETON, NJ -- Six decades after the United States dropped atomic bombs on Hiroshima and Nagasaki, which effectively ended World War II, a majority of Americans, 57%, say they approve of using the bombs, while 38% disapprove.

As you may know, the United States dropped atomic bombs on Hiroshimaand Nagasaki in August 1945 near the end of World War II. Looking back, would you say you approve or disapprove of using the atomic bomb on Japanese cities in 1945?

	Approve (%)	**Disapprove** (%)	**No opinion** (%)
2005 Jul 25-28	57	38	5
1995 Jul 20-23	59	35	6
1994 Dec 2-5	55	39	6
1991 Nov 21-24	53	41	6
1990 Jul 19-21	53	41	6
1945 Aug 10-15 *	85	10	5

* WORDING: *Do you approve or disapprove of using the new atomic bomb on Japanese cities?*

	Approve	**Disapprove**	**No opinion**
	%	%	%
2005	57	38	5
1995	59	35	6

1994	55	39	6
1991	53	41	6
1990	53	41	6
1945 *	85	10	5
* WORDING: *Do you approve or disapprove of using the new atomic bomb on Japanese cities?*			

The views expressed around the 60th anniversary of that historic event, the only time atomic weapons have ever been used in war, are not much different from the views expressed 10 years ago around the 50th anniversary. But approval differs substantially from the overwhelming support Americans gave just a few days after the bombs were dropped in August 1945. At that time, 85% said they approved and just 10% disapproved.

A major factor in President Harry S. Truman's decision to bomb Hiroshima and Nagasaki was that the bombs would hasten the end of the war and thus save American lives. Today, 80% of Americans believe the bombs did in fact save American lives by shortening the war. Ten years ago, the percentage was slightly higher, at 86%.

Do you think dropping the atomic bombs saved American lives by shortening the war, or not?

	Yes, saved American lives	**No, did not**	**No opinion**
2005 Jul 25-28	80%	16	4
1995 Jul 20-23	86%	7	7

The public is more ambivalent, however, about the long-term consequences to the Japanese people. While 41% of Americans say they think that dropping the atomic bombs saved more Japanese lives than would have been lost if the war had continued, 47% believe that dropping the bombs ultimately cost more Japanese lives. These views are not much different from those measured 10 years ago.

Do you think that dropping the atomic bombs saved more Japanese lives than would have been lost if the war had continued, or did dropping the bomb COST more Japanese lives?

	Saved more Japanese lives	**Cost more Japanese lives**	**No opinion**
2005 Jul 25-28	41%	47	12
1995 Jul 20-23	40%	45	15

Gender, Party, and Age Differences

The poll shows that men are much more likely than women, and Republicans are more likely than Democrats, to express positive views about the bombing in Japan. To a lesser extent, older people are more positive than younger people.

Overall, 73% of men, but only 42% of women, approve of the bombing. Similarly, 73% of Republicans, 53% of independents, and just 47% of Democrats approve. An irony here is that it was a Democratic president who made the decision to drop the bombs, though now Democrats give the least support among the three partisan groups.

The large gender gap is not due solely to the fact that men disproportionately identify as Republicans and women as Democrats. Even within the party faithful, there are large differences in views between men and women.

Among Republican men, 87% approve of the bombing, compared with 60% of Republican women -- a gender gap of 27 percentage points. Among independents, the gap is even larger, at 40 percentage points (71% of men approve vs. just 31% of women). And among Democrats, the gender gap is 26 percentage points (63% of men approve, as do 37% of women).

PERCENTAGE OF EACH GROUP WHO *APPROVE* OF DROPPING ATOMIC BOMBS ON JAPAN

	Republicans	**Independents**	**Democrats**	**Difference Republicans vs. Democrats**
Male	87%	71%	63%	+24
Female	60%	31%	37%	+23
Difference males vs. females	+27	+40	+26	

Note that among each gender group, the differences between Republicans and Democrats are similar. Eighty-seven percent of male Republicans approve, compared with 63% of male Democrats, a difference of 24 percentage points. Similarly, 60% of female Republicans, while only 37% of female Democrats, approve -- a difference of 23 percentage points.

Younger people are somewhat less likely to approve of the bombing than are older people -- an average of 53% approval among people under age 50, compared with 63% among people 50 and older.

Similar patterns of differences by gender and party are also found on the other two questions about the bombing. Men and Republicans are more likely than their counterparts to say the bombing helped save American and Japanese lives.

Survey Methods

Results are based on telephone interviews with 1,010 national adults, aged 18 and older, conducted July 25-28, 2005. For results based on the total sample of national adults, one can say with 95% confidence that the maximum margin of sampling error is ±3 percentage points.

In addition to sampling error, question wording and practical difficulties in conducting surveys can introduce error or bias into the findings of public opinion polls.

Before the Fall-Out

The following text is the prologue of the book by Diana Preston: ***Before the Fall-Out: The Human Chain Reaction from Marie Curie to Hiroshima***, London: Doubleday, 2005, pp. 1-8.

On 6 August 1945, the Christian feast of the Transfiguration, the Festival of Light, a young mother, Futaba Kitayama, looked up to see 'an airplane as pretty as a silver treasure flying from East to the West in the cloudless pure blue sky'. Someone standing by her said, 'A parachute is falling.' Then the parachute exploded into 'an indescribable light'.

The American B-29 bomber *Enola Gay* had just dropped 'Little Boy', a four-ton bomb which detonated with the explosive power of 15,000 tons of TNT over the Japanese city of Hiroshima. Pilot Paul Tibbets, who had the day before named his plane after his own mother, struggled to hold the aircraft steady as the first shock waves hit. Bathed in a bright light, he looked back and saw 'a giant purple mushroom boiling upward like something terribly alive'. He switched on the intercom and announced to his shaken crew, 'Fellows, you have just dropped the first atomic bomb in history.'

On the ground, Futaba Kitayama felt her face become strangely damp; 'When I wiped my face the skin peeled off.' Her eyes began to mist over and close as her face swelled. 'Suddenly driven by a terror that would not permit inaction' she staggered past writhing, flayed bodies as she tried to escape. To one doctor in the doomed city, the pervasive stench of burnt flesh was like 'dried squid when it is grilled — the squid we like so much to eat'. By December 1945, about 140,000 inhabitants of Hiroshima would be dead, either as a result of the blast and the fires that followed or of the insidious, silent effects of nuclear radiation.

When news of the bombing was announced, young Allied soldiers preparing for the invasion of Japan 'cried with relief and joy. We were going to live. We were going to grow up to adulthood after all.' President Truman told a group of sailors aboard the cruiser on which he was returning from the Potsdam Conference, 'This is the greatest thing in history.' Winston Churchill struck a more reflective note: 'This revelation of the secrets of nature, long mercifully withheld from man, should arouse the most solemn reflections in the mind and conscience of every human being capable of comprehension.' Only three days after Hiroshima, and within days of giving birth to her second son, a New York mother wrote, 'torturing regrets that I have brought children into the world to face such a dreadful thing as this have shivered through me. It seems that it will be for them all their lives like living on a keg of dynamite which may go off at any moment.'

Soon, worries were widespread that the invention of the bomb had unleashed a Frankenstein's monster capable of striking back at its creators in a wholesale and indiscriminate fashion. Although over the past sixty years such concerns have wavered in intensity and the source of the perceived threat has varied, the fear that a single plane or a single person with a suitcase can obliterate a city haunts us today.[2]

The destructive flash that seared Hiroshima into history was the culmination of fifty years of scientific creativity and more than fifty years of political and military turmoil. Gener-

[2] In 1998 a Russian general revealed that the Soviet Union had previously developed a portable atomic bomb and that, by then, fewer than half of the more than a hundred manufactured could be accounted for. Despite subsequent official Russian denials that any were missing and assurances that all would be destroyed by 2000, experts remain concerned.

ations of scientists had contributed to that moment in physics. Yet, when they first began to tease out the secrets of matter not even future Nobel Prize winners could have predicted how their pioneering insights would combine with exterior events to produce such a moment in history. Like all in this story, they were only human.

For the scientists of many nations, the journey of discovery had begun in the 1890s when dedicated researchers such as Marie Curie, working alone or in small teams with rudimentary equipment, intent on achieving a fuller understanding of nature, started to identify the minute building blocks forming the world around them. Blinding discoveries were matched by blind alleys. People rushed to publish their results, not for profit nor for national prestige and power, often not even for personal glory, but rather for the pure joy of knowledge.

For a long time no-one realized their work could unlock immense energy to furnish a devastating new weapon, or, indeed, if properly harnessed, to provide a city with electricity. At the beginning of the twentieth century, radioactivity was seen as only producing benefits to health through the use of X-rays for diagnosis and the use of radioactive materials to treat many diseases including cancer. Physics was a new subject. The 1910 *Encyclopaedia Britannica* devoted fifty pages to chemistry, but physics did not feature. Around that time there were, perhaps, a thousand physicists worldwide, of whom maybe 10 per cent were engaged in the study of radioactivity. Consequently, all those involved knew one another. At a time of intense national rivalry and of competition for empire, trade and natural resources, results were pooled internationally, as further pieces in a communal jigsaw for which no-one had the master picture or pictures. Scientists studied at one another's institutes. North Americans and Japanese visited Germany; Germans came to Britain; Britons went to North America; Russians studied in France. Colleagues skied, hiked and made music together. Allegiances and rivalries stemmed from where and with whom people had studied, rather than from nationality or race.

All met at conferences, where results were shared, contacts maintained and gossip exchanged. Albert Einstein called them 'witches' sabbaths'. Few conferences were as marked by gossip as that in Brussels in 1911, when Marie Curie was forced to withdraw as a result of an alleged affair with Paul Langevin, a close colleague and a married man. However, personalities were strong, and debate often heated. This was particularly the case when entirely novel such as relativity or quantum theory were discussed, which undermined the Newtonian concept of a predictable, mechanical world whose ordered processes could be measured and whose future behaviour could be as accurately forecast as its past could be determined. Those involved were, as they recalled, undertaking 'wholly new processes of thought beyond all the previous notions in physics', and 'filled with such tension that it almost took [their] breath away . . .' 'It was an heroic time . . . not the doing of any one man' but 'the collaboration of scores of scientists from many different countries . . . a period of patient work in the laboratory, of crucial experiments and daring action, of many false starts and many untenable conjectures . . . It was a time of creation . . .'

Yet when, in 1933, despite the great advances already made, one of the world's leading physicists, Ernest Rutherford, dismissed the idea of harnessing energy from atoms as 'moonshine', the physicists' world was changing. Hitler was in power. Scientists who had once travelled simply to where the best science was were now compelled to flee his and other totalitarian regimes because of their race or political views. Ernest Rutherford himself became one of those who did most to welcome them and find them work. Their knowledge and brain power were to prove vital to their hosts in the impending conflict.

In Berlin in 1939, on the eve of the long-feared war, German scientists, with considerable secret help from one of their exiled Jewish former colleagues, Lise Meitner, discovered nuclear fission — a way to unleash the power of the atom. Scientists across the world recognized that an atomic weapon might be a possibility. The personal experience of the émigrés gave added urgency to their efforts to stimulate the democracies to action so that Germany could not blackmail the world into submission by her possession of a unique and uniquely destructive weapon. The success of their advocacy meant that what had for more than forty years been an open quest for knowledge became, almost overnight, a race between belligerent nations, working in secret with large teams, for high and sinister stakes, using all available means of sabotage, espionage and disinformation to thwart their opponents.

The scientists' fears of their German colleagues' potential led one British physicist, during the 1940-1 Blitz, surreptitiously to take a Geiger counter from his laboratory to monitor bomb craters in case the enemy had mixed radioactive materials with conventional explosives to contaminate whole areas and poison their inhabitants. Allied scientists remained so concerned about what now called 'dirty bombs' that they warned General Dwight D. Eisenhower that the Germans might well use them against the Allied troops under his command during the D-Day landings in Normandy in June 1944.

Well before D-Day, nuclear physics had become big science and big engineering. No other country was able to replicate the resources put into the American Manhattan Project. It cost $2 billion and was as big as the US car industry. The Project employed 130,000 people, from American and British scientists to security guards and the process workers, not counting the military and government staff and politicians.

A fortnight after Hiroshima, an editorial in *Life* magazine commented, 'Our sole safeguard against the very real danger of a reversion to barbarism is the kind of morality which compels the individual conscience, be the group right or wrong. The individual conscience against the atomic bomb? Yes, there is no other way. No limits are set to our Promethean ingenuity provided we remember that we are not Jove.' The very success of the bomb project in its own terms retrospectively sharpened the moral searchings among those involved. To some it carne to symbolize science's loss of innocence. Sound sense and acute sensibility coexisted uneasily in the character of Robert Oppenheimer, the scientific leader of the Manhattan Project. For as long as it took to complete his task, he subdued his humanist principles to achieve the most inhumane of weapons, but he would later state that 'physicists had known sin' and that he, personally, was 'not completely free of a sense of guilt'. Another leading scientist said that the bomb had 'killed a beautiful subject'.

However, even before the bomb was dropped, a sense of individual responsibility had compelled other key staff to speak out. Joseph Rotblat, a future winner of the Nobel Prize for Peace, actually left the Manhattan Project when he realized that the weapon would become a permanent part of military arsenals which politicians were prepared to contemplate using against their then ally Russia, as well as against Germany. The Dane Niels Bohr and the Hungarian refugee Leo Szilard both argued for international co-operation and control of the discovery, and for a demonstration of the bomb's explosive power before all nations, rather than its immediate use in combat.[3]

[3] Szilard personifies the complex character of many of the scientists. One of the brightest minds and sharpest and most liberal analysts of the moral dilemma, he had such an opinion of himself and aversion to physical labour that he employed others to do his experimental work and was thrown out of his residential apartment at Chicago

For most of the war, the moral dilemmas posed to scientists in Axis countries and in those under German occupation, such as Denmark and France, were starker and entailed immediate personal vulnerability. The ambiguities and uncertainties of the Copenhagen meeting in 1941 between the leading German nuclear physicist Werner Heisenberg and Niels Bohr have been widely explored, but others also strove to reconcile personal conscience and patriotic sentiment. Fritz Strassmann, one of the discoverers of fission, hid a Jewish pianist in his Berlin apartment while working on nuclear calculations for the Nazi government. Before later joining the resistance and helping to liberate Paris, Marie Curie's son-in-law, Frédéric Joliot-Curie, had to decide how far he could acquiesce in German use of his nuclear institute in Paris at a time when the prospects of Allied victory seemed remote.

The majority of Allied scientists involved would maintain that Oppenheimer's apologia was unwarranted. Knowledge was neutral; the use to which politicians put it was the dilemma. In any case, the Allies could not have neglected the weapon's potential when they knew that the Germans had embarked on a weapons research programme. That an Allied team had won the race on behalf of the democracies was preferable to any other outcome.

Whichever view the scientists took, the final decision to use the bomb was a political one, and one which the American and British public supported overwhelmingly on the grounds that it saved Allied lives and brought the war to a speedier end than would otherwise have been the case. With hindsight, and with distance from the feelings of individuals in war-weary nations who were apprehensive of the cost in terms of the lives of their loved ones of an invasion of Japan, historians have questioned the political judgements. They have suggested that there were alternatives to the use of the atomic bomb to end the war which would have saved Japanese lives without sacrificing Allied ones.

The moral issues that faced both the physicists in advising on the use of the bomb and the politicians in deciding upon it were, in fact, at least half a century old. Alfred Nobel, the inventor of nitroglycerine and the founder of the Nobel Prizes, not least for peace, had justified his invention as putting an end to war. In 1899, at the time of Marie Curie's pioneering work on radium, the nations of the world met at the Hague to discuss how to avoid conflict by the creation of systems for arbitration. They also laid down in the Hague Convention rules for the conduct of war if it could not be avoided. Among them, four years before the first powered flight, was a prohibition against bombarding 'by whatever means . . . undefended' civilian towns or buildings, and another prohibition against the dropping of bombs from balloons 'or other kinds of aerial vessels'.

A second conference was held at the Hague in 1907 at the instigation of President Theodore Roosevelt to review the provisions of the first. Only twenty-seven countries, including Britain and the US, supported renewal of the ban on aerial warfare. Seventeen, including Germany and Japan, did not, so the provision fell. All could agree, however, on a definition of targets permitted to be bombarded by whatever means. Civilian targets were still excluded, but aerial bombardment had gained legitimacy.

The First World War brought science and warfare together in a way no other conflict had. On the evening of 22 Apri1 1915, Germany launched the world's first poison gas attack. The German scientist in charge of the programme defended the use of gas as a means of shortening the war and thus saving lives. After initially condemning the attacks as further breaches

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University for habitually refusing to empty his bath water or flush the lavatory on the grounds that this was 'maid's work'.

of the rule of civilized law by the barbarous 'Hun', Britain, France and later the United States, after her entry into the war, did not long delay in following suit. By the Armistice, Allied production of chemical weapons far exceeded Germany's. The 'Great War' would also come to be known as the 'Chemists' War'. By the end of the conflict, about 5,500 scientists on all sides had worked on chemical weapons alone, and there had been a million casualties from gas attacks. Among them was Lance Corporal Adolf Hitler, who, temporarily blinded by a British gas grenade on 13 October 1918, was still in hospital the day Germany surrendered nearly a month later. Yet this 'war to end wars' would not do so, and the next world conflict, precipitated by that lance corporal, would be the physicists' war.

The First World War had seen the death of some ten million men, the fall of three empires, the establishment of a major communist state and the emergence of the aeroplane as a weapon. Yet, at post-war conferences, countries were lukewarm about defining further rules for the conduct of air warfare. No agreement was ever ratified. Over the years, the definition of what in the previously agreed documents was 'civilian' and thus free from attack became blurred. At the beginning of the Second World War, President Franklin Roosevelt pleaded with the belligerents to refrain from 'bombardment from the air of civilian populations or unfortified cities'. The 1940 memorandum from two émigrés to the British government arguing that an atomic bomb was feasible and urging an immediate start to a research programme suggested that the very likely high number of civilian casualties 'may make it unsuitable as a weapon for use by this country'.

Yet, over the next five years of increasingly total war the Allied air forces followed the precedents set by their enemies and attacked whole cities such as Hamburg, Dresden and Tokyo, in the latter attack using the newly developed 'sticky fire' — napalm. Even before 6 August 1945 any distinction between civilians and combatants had been eliminated in practice, if not in presentation.

Today, we still experience the scientific, political and moral fall-out from 6 August 1945. Against the tumultuous background of the history of the first half of the twentieth century, *Before the Fall-Out* explains how joy in pure scientific discovery created a beautiful science which was suddenly transmuted into a wartime sprint for the ultimate weapon. Through the stories and voices of those involved it tells how individuals responded to the questions of personal responsibility posed by the results of their compulsive curiosity, and why the bomb fell on Hiroshima and its people and changed our world for ever.

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Two decisions, 1945 and 1950: Initial use and the H Bomb (memoirs)

By way of introduction: the 1943 Quebec Agreement 43-43

1. Harry S. Truman, *Memoirs by:* Vol. I, *Year of Decisions (1945),* Garden City, N.Y.: Doubleday & Company, Inc., 1955, pp. 415-426. 44-52

2. Harry S. Truman, *Memoirs by*: Vol. II, *Years of Trial and Hope (1946-1952)*, Garden City, New York: Doubleday & Company, Inc., 1955-1956, pp. 1-16. 52-63

3. Winston S. Churchill, *Triumph and Tragedy*, Vol. VI of *The Second World War*, Boston: Houghton Mifflin Company, 1953, pp. 637-646 and 669-670. 63-68

4. Bernard M. Baruch, *Baruch: The Public Years*, Vol. II of *My Own Story*, New York: Holt, Rinehart and Winston, 1960, pp. 358-382. 69-81

5. James F. Byrnes, *Speaking Frankly*, New York: Harper & Brothers, 1947, 257-276. 81-95

6. Clement R. Attlee, *As It Happened: The Autobiography of*, New York: The Viking Press, 1954, pp. 226-227. 95-96

7. George F. Kennan, *Memoirs*, *1925-1950*, Boston: Little, Brown and Company, 1967, pp. 471-476 96-99

8. Dean Acheson, *Present at the Creation: My Years in the State Department*, New York: W.W. Norton, 1969, pp. 164-168 y 344-349. 99-107|

9. Lord Gladwyn, *The Memoirs of*, New York: Weybright and Talley, 1972, pp. 261-267. 107-111

Quebec Agreement (1943) (From Wikipedia, the free encyclopedia)

The **Quebec Agreement** is an Anglo-Canadian-American document outlining the terms of nuclear nonproliferation between the United Kingdom and the United States, and signed by Winston Churchill and Franklin Delano Roosevelt on August 19, 1943, two years before the end of World War II, in Quebec City, Quebec, Canada.

The agreement was needed because nuclear co-operation among the United States, the United Kingdom, and Canada was becoming so difficult that Winston Churchill had sought information about setting up an entirely separate, British atomic-bomb project. In July 1943, in London, American officials cleared up some major misunderstandings about British motives, and the agreement was drafted.

After the signing, the United Kingdom handed over all of its material to the United States and, in return, received all the copies of the American progress reports to the president. The British atomic research was subsumed then into the Manhattan Project until after the war, and a large team of British and Canadian scientists moved to the United States.

In a section of the Quebec Agreement formally entitled "Articles of Agreement governing collaboration between the authorities of the U.S.A. and UK in the matter of Tube Alloys", the United Kingdom and the United States agreed to share resources "to bring the Tube Alloys [i.e. the Atomic Bomb] project to fruition at the earliest moment."

The leaders also agreed as follows:

- "we will never use this agency against each other"
- "we will not use it against third parties without each other's consent"
- "we will not either of us communicate any information about Tube Alloys to third parties except by mutual consent"

The agreement also established a Combined Policy Committee composed of Canadian, British, and American representatives to oversee and coordinate weapons development. It was also agreed that "any post-war advantages of an industrial or commercial nature" would be decided at the discretion of the United States president. Although the document does not explicitly include "military" in "industrial or commercial", the subsequent view of the United States was to include "military" in the meaning, much to the displeasure of the United Kingdom.

One of the major strains of the Agreement came up in 1944, when it was revealed to the United States that the United Kingdom had earlier made a secret agreement with Hans von Halban to share nuclear information with France after the war in exchange for free use of a number of patents related to nuclear reactors and filed by Frederic Joliot and his Collège de France team. Upon this revelation, the United States objected, stating that the Halban agreement violated the terms of the Quebec Agreement, namely the section about the third-party information-sharing. At Churchill's urging, the United Kingdom broke its obligations to France in order to satisfy the United States.

After the war, the United Kingdom was unilaterally excluded from American nuclear research by the McMahon Act, and so created its own atomic-bomb program, but with much information from the joint work on the Manhattan Project.

The **Hyde Park Agreement** was also entered into by Roosevelt and Churchill when Churchill saw Roosevelt at Hyde Park on 17 & 18 September 1944. This provided for *Full collaboration between the United States and the British Government in developing Tube Alloys* (the British code name for the bomb project) *for military and commercial purposes should continue after*

the defeat of Japan unless and until terminated by joint agreement" However *"This agreement was improperly filed at Hyde Park under "Tube Alloys" and so did not become known to Stimson or General Marshall until after the war, when the United Kingdom furnished a copy. Even then, Groves questioned the document's authenticity until the United States' copy was located."*[4]

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1. Memoiris of Harry S. Truman, President of the United States from 1945 to 1953: Chapter 26 of volume one, *Memoirs: Year of Decisions* (Garden City, N.Y.: Doubleday & Company, Inc., 1955), pp. 415-426.

CHAPTER 26

The historic message of the first explosion of an atomic bomb was flashed to me in a message from Secretary of War Stimson on the morning of July 16. The most secret and the most daring enterprise of the war had succeeded. We were now in possession of a weapon that would not only revolutionize war but could alter the course of history and civilization. This news reached me at Potsdam the day after I had arrived for the conference of the Big Three.

Preparations were being rushed for the test atomic explosion at Alamogordo, New Mexico, at the time I had to leave for Europe, and on the voyage over I had been anxiously awaiting word on the results. I had been told of many predictions by the scientists, but no one was certain of the outcome of this full-scale atomic explosion. As I read the message from Stimson, I realized that the test not only met the most optimistic expectation of the scientists but that the United States had in its possession an explosive force of unparalleled power.

Stimson flew from Frankfurt to Potsdam the next day to see me and brought with him the full details of the test. I received him at once and called in Secretary of State Byrnes, Admiral Leahy, General Marshall, General Arnold, and Admiral King to join us at my office at the Little White House. We reviewed our military strategy in the light of this revolutionary development. We were not ready to make use of this weapon against the Japanese, although we did not know as yet what effect the new weapon might have, physically or psychologically, when used against the enemy. For that reason the military advised that we go ahead with the existing military plans for the invasion of the Japanese home islands.

At Potsdam, as elsewhere, the secret of the atomic bomb was kept closely guarded. We did not extend the very small circle of Americans who knew about it. Churchill naturally knew about the atomic bomb project from its very beginning, because it had involved the pooling of British and American technical skill.

On July 24 I casually mentioned to Stalin that we had a new weapon of unusual destructive force. The Russian Premier showed no special interest. All he said was that he was glad to hear it and hoped we would make "Good use of it against the Japanese."

A month before the test explosion of the atomic bomb the service Secretaries and the Joint Chiefs of Staff had laid their detailed plans for the defeat of Japan before me for approval. There had apparently been some differences of opinion as to the best route to be followed, but these had evidently been reconciled, for when General Marshall had presented his plan for a two-phase invasion of Japan, Admiral King and General Arnold had supported the proposal heartily.

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[4] Nichols, K. D. *The Road to Trinity* page 177 (1987, Morrow, New York).

The Army plan envisaged an amphibious landing in the fall of 1945 on the island of Kyushu, the southernmost of the Japanese home islands. This would be accomplished by our Sixth Army, under the command of General Walter Krueger. The first landing would then be followed approximately four months later by a second great invasion, which would be carried out by our Eighth and Tenth Armies, followed by the First Army transferred from Europe, all of which would go ashore in the Kanto plains area near Tokyo. In all, it had been estimated that it would require until the late fall of 1946 to bring Japan to her knees.

This was a formidable conception, and all of us realized fully that the fighting would be fierce and the losses heavy. But it was hoped that some of Japan's forces would continue to be preoccupied in China and others would be prevented from reinforcing the home islands if Russia were to enter the war.

There was, of course, always the possibility that the Japanese might choose to surrender sooner. Our air and fleet units had begun to inflict heavy damage on industrial and urban sites in Japan proper. Except in China, the armies of the Mikado had been pushed back everywhere in relentless successions of defeats.

Acting Secretary of State Grew had spoken to me in late May about issuing a proclamation that would urge the Japanese to surrender but would assure them that we would permit the Emperor to remain as head of the state. Grew backed this with arguments taken from his ten years' experience as our Ambassador in Japan, and I told him that I had already given thought to this matter myself and that it seemed to me a sound idea. Grew had a draft of a proclamation with him, and I instructed him to send it by the customary channels to the Joint Chiefs and the State-War-Navy Coordinating Committee in order that we might get the opinions of all concerned before I made my decision.

On June 18 Grew reported that the proposal had met with the approval of his Cabinet colleagues and of the Joint Chiefs. The military leaders also discussed the subject with me when they reported the same day. Grew, however, favored issuing the proclamation at once, to coincide the closing of the campaign on Okinawa, while the service chiefs were of the opinion that we should wait until we were ready to follow a Japanese refusal with the actual assault of our invasion forces.

It was my decision then that the proclamation to Japan should be issued from the forthcoming conference at Potsdam. This, I believed, would clearly demonstrate to Japan and to the world that the Allies were united in their purpose. By that time, also, we might know more about two matters of significance for our future effort: the participation of the Soviet Union and the atomic bomb. We knew that the bomb would receive its first test in mid-July. If the test of the bomb was successful, I wanted to afford Japan a clear chance to end the fighting before we made use of this newly gained power. If the test should fail, then it would be even more important to us to bring about a surrender before we had to make a physical conquest of Japan. General Marshall told me that it might cost half a million American lives to force the enemy's surrender on his home grounds.

But the test was now successful. The entire development of the atomic bomb had been dictated by military considerations. The idea of the atomic bomb had been suggested to President Roosevelt by the famous and brilliant Dr. Albert Einstein, and its development turned out to be a vast undertaking. It was the achievement of the combined efforts of science, industry, labor, and the military, and it had no parallel in history. The men in charge and their staffs worked under extremely high pressure, and the whole enormous task required the services of more than one hundred thousand men and immense quantities of material. It required over two and a half years and necessitated the expenditure of two and a half billions of dollars.

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Only a handful of the thousands of men who worked in these plants knew what they were producing. So strict was the secrecy imposed that even some of the highest-ranking officials in Washington had not the slightest idea of what was going on. I did not. Before 1939 it had been generally agreed among scientists that it was theoretically possible to release energy from the atom. In 1940 we had begun to pool with Great Britain all scientific knowledge useful to war, although Britain was at war at that time and we were not. Following this—in 1942—we learned that the Germans were at work on a method to harness atomic energy for use as a weapon of war. This, we understood, was to be added to the V-1 and V-2 rockets with which they hoped to conquer the world. They failed, of course, and for this we can thank Providence. But now a race was on to make the atomic bomb—a race that became "the battle of the laboratories."

It was under the general policy of pooling knowledge between our nation and Great Britain that research on the atomic bomb started in such feverish secrecy. American and British scientists joined in the race against the Germans. We in America had available a great number of distinguished scientists in many related fields of knowledge, and we also had another great advantage. We could provide the tremendous industrial and economic resources required for the project—a vastly expensive project—without injury to our war production program. Furthermore, our plants were far removed from the reach of enemy bombing. Britain, whose scientists had initiated the project and were contributing much of the original atomic data, was constantly exposed to enemy bombing and, when she started the atomic research, also faced the possibility of invasion.

For these reasons Roosevelt and Churchill agreed to pool the research and concentrate all of the work on the development of the project within the United States. Working together with the British, we thus made it possible to achieve a great scientific triumph in the field of atomic energy. Nevertheless, basic and historic as this event was, it had to be considered at the time as relatively incidental to the far-flung war we were fighting in the Pacific at terrible cost in American lives.

We could hope for a miracle, but the daily tragedy of a bitter war crowded in on us. We labored to construct a weapon of such overpowering force that the enemy could be forced to yield swiftly once we could resort to it. This was the primary aim of our secret and vast effort. But we also had to carry out the enormous effort of our basic and traditional military plans.

The task of creating the atomic bomb had been entrusted to a special unit of the Army Corps of Engineers, the so-called Manhattan District, headed by Major General Leslie R. Groves. The primary effort, however, had come from British and American scientists working in laboratories and offices scattered throughout the nation.

Dr. J. Robert Oppenheimer, the distinguished physicist from the University of California, had set up the key establishment in the whole process at Los Alamos, New Mexico. More than any other one man, Oppenheimer is to be credited with the achievement of the completed bomb.

My own knowledge of these developments had come about only after I became President, when Secretary Stimson had given me the full story. He had told me at that time that the project was nearing completion and that a bomb could be expected within another four months. It was at his suggestion, too, that I had then set up a committee of top men and had asked them to study with great care the implications the new weapon might have for us.

Secretary Stimson headed this group as chairman, and the other members were George L. Harrison, president of the New York Life Insurance Company, who was then serving as a special assistant to the Secretary of War; James F. Byrnes, as my personal representative; Ralph

A. Bard, Under Secretary of the Navy; Assistant Secretary William L. Clayton for the State Department; and three of our most renowned scientists—Dr. Vannevar Bush, president of the Carnegie Institution of Washington and Director of the Office of Scientific Research and Development; Dr. Karl T. Compton, president of the Massachusetts Institute of Technology and Chief of Field Service in the Office of Scientific Research and Development; and Dr. James B. Conant, president of Harvard University and chairman of the National Defense Research Committee.

This committee was assisted by a group of scientists, of whom those most prominently connected with the development of the atomic bomb were Dr. Oppenheimer, Dr. Arthur H. Compton, Dr. E. 0. Lawrence, and the Italian-born Dr. Enrico Fermi. The conclusions reached by these men, both in the advisory committee of scientists and in the larger committee, were brought to me by Secretary Stimson on June 1.

It was their recommendation that the bomb be used against the enemy as soon as it could be done. They recommended further that it should be used without specific warning and against a target that would clearly show its devastating strength. I had realized, of course, that an atomic bomb explosion would inflict damage and casualties beyond imagination. On the other hand, the scientific advisers of the committee reported, "We can propose no technical demonstration likely to bring an end to the war; we see no acceptable alternative to direct military use." It was their conclusion that no technical demonstration they might propose, such as over a deserted island, would be likely to bring the war to an end. It had to be used against an enemy target.

The final decision of where and when to use the atomic bomb was up to me. Let there be no mistake about it. I regarded the bomb as a military weapon and never had any doubt that it should be used. The top military advisers to the President recommended its use, and when I talked to Churchill he unhesitatingly told me that he favored the use of the atomic bomb if it might aid to end the war.

In deciding to use this bomb I wanted to make sure that it would be used as a weapon of war in the manner prescribed by the laws of war. That meant that I wanted it dropped on a military target. I had told Stimson that the bomb should be dropped as nearly as possibly upon a war production center of prime military importance.

Stimson's staff had prepared a list of cities in Japan that might serve as targets. Kyoto, though favored by General Arnold as a center of military activity, was eliminated when Secretary Stimson pointed out that it was a cultural and religious shrine of the Japanese.

Four cities were finally recommended as targets: Hiroshima, Kokura, Niigata, and Nagasaki. They were listed in that order as targets for the first attack. The order of selection was in accordance with the military: importance of these cities, but allowance would be given for weather conditions at the time of the bombing. Before the selected targets were approved as proper for military purposes, I personally went over them in detail with Stimson, Marshall, and Arnold, and we discussed the matter of timing and the final choice of the first target.

General Spaatz, who commanded the Strategic Air Forces, which would deliver the bomb on the target, was given some latitude as to when and on which of the four targets the bomb would be dropped. That was necessary because of weather and other operational considerations. In order to get preparations under way, the War Department was given orders to instruct General Spaatz that the first bomb would be dropped as soon after August 3 as weather would permit. The order to General Spaatz read as follows:

24 July 1945

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TO: General Carl Spaatz
Commanding General
United States Army Strategic Air Forces

1. The 509 Composite Group, 20th Air Force will deliver its first special bomb as soon as weather will permit visual bombing after about 3 August 1945 on one of the targets: Hiroshima, Kokura, Niigata and Nagasaki. To carry military and civilian scientific personnel from the War Department to observe and record the effects of the explosion of the bomb, additional aircraft will accompany the airplane carrying the bomb. The observing planes will stay several miles distant from the point of impact of the bomb.
2. Additional bombs will be delivered on the above targets as soon as made ready by the project staff. Further instructions will be issued concerning targets other than those listed above.
3. Dissemination of any and all information concerning the use of the weapon against Japan is reserved to the Secretary of War and the President of the United States. No communiqué on the subject or release of information will be issued by Commanders in the field without specific prior authority. Any news stories will be sent to the War Department for special clearance.
4. The foregoing directive is issued to you by direction and with the approval of the Secretary of War and the Chief of Staff, U.S.A. It is desired you personally deliver one copy of this directive to General MacArthur and one copy to Admiral Nimitz for their information.

/s/ Thos. T. Handy
General, GSC
Acting Chief. of Staff

With this order the wheels were set in motion for the first use of an atomic weapon against a military target. I had made the decision. I also instructed Stimson that the order would stand unless I notified him that the Japanese reply to our ultimatum was acceptable.

A specialized B-29 unit, known as the 509th Composite Group, had been selected for the task, and seven of the modified B-29's, with pilots and crews, were ready and waiting for orders. Meanwhile ships and planes were rushing the materials for the bomb and specialists to assemble them to the Pacific island of Tinian in the Marianas.

On July 28 Radio Tokyo announced that the Japanese government would continue to fight. There was no formal reply to the joint ultimatum of the United States, the United Kingdom, and China. There was no alternative now. The bomb was scheduled to be dropped after August 3 unless Japan surrendered before that day.

On August 6, the fourth day of the journey home from Potsdam, came historic news that shook the world. I was eating lunch with members of the *Augusta's* crew when Captain Frank Graham, White House Map Room watch officer, handed me the following message:

Following info regarding Manhattan received. "Hiroshima bombed with visually only one tenth cover at 052315A. There was no fighter opposition and no flak. Parsons reports 15 minutes after drop as follows: 'Results clear cut successful in all respects. Visible effects greater than in any test. Conditions normal in airplane following delivery.' "

I was greatly moved. I telephoned Byrnes aboard ship to give him the news and then said to the group of sailors around me, "This is the greatest thing in history. It's time for us to get home."

A few minutes later a second message was handed to me. It read as follows:

TO THE PRESIDENT
FROM THE SECRETARY OF WAR

Big bomb dropped on Hiroshima August 5 at 7:15 P.M. Washington time. First reports indicate complete success which was even more conspicuous than earlier test.

When I had read this I signaled to the crew in the mess hall that I wished to say something. I then told them of the dropping of a powerful new bomb which used an explosive twenty thousand times as powerful as a ton of TNT. I went to the wardroom, where I told the officers who were at lunch, what had happened. I could not keep back my expectation that the Pacific war might now be brought to a speedy end.

A few minutes later the ship's radio receivers began to carry news bulletins from Washington about the atomic bomb, as well as a broadcast of the statement I had authorized just before leaving Germany. Shortly afterward I called a press conference of the correspondents on board and told them something of the long program of research and development that lay behind this successful assault.

My statements on the atomic bomb, which had been released in Washington by Stimson, read in part as follows:

. . . But the greatest marvel is not the size of the enterprise, its secrecy, nor its cost, but the achievement of scientific brains in putting together infinitely complex pieces of knowledge held by many men in different fields of science into a workable plan. And hardly less marvelous has been the capacity of industry to design, and of labor to operate, the machines and methods to do things never done before, so that the brain child of many minds came forth in physical shape and performed as it was supposed to do. Both science and industry worked under the direction of the United States Army, which achieved a unique success in managing so diverse a problem in the advancement of knowledge in an amazingly short time. It is doubtful if such another combination could be got together in the world. What has been done is the greatest achievement of organized science in history. It was done under high pressure and without failure.

We are now prepared to obliterate more rapidly and completely every productive enterprise the Japanese have above ground in any city. We shall destroy their docks, their factories, and their communications. Let there be no mistake; we shall completely destroy Japan's power to make war.

It was to spare the Japanese people from utter destruction that the ultimatum of July 26 was issued at Potsdam. Their leaders promptly rejected that ultimatum. If they do not now accept our terms, they may expect a rain of ruin from the air, the like of which has never been seen on this earth. Behind this air attack will follow sea and land forces in such numbers and power as they have not yet seen and with the fighting skill of which they are already well aware.

. . . The fact that we can release atomic energy ushers in a new era in man's understanding of nature's forces. Atomic energy may in the future supplement the power that now comes from coal, oil, and falling water, but at present it cannot be produced on a basis to compete with them commercially. Before that comes there must be a long period of intensive research.

It has never been the habit of the scientists of this country or the policy of this Government to withhold from the world scientific knowledge. Normally, therefore, everything about the work with atomic energy would be made public.

But under present circumstances it is not intended to divulge the technical processes of production or all the military applications, pending further examination of possible methods of protecting us and the rest the world from the danger of sudden destruction.

I shall recommend that the Congress of the United States consider promptly the establishment of an appropriate commission to control the production and use of atomic power within the United States.

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> I shall give further consideration and make further recommendations to the Congress as to how atomic power can become a powerful and forceful influence towards the maintenance of world peace.

Still no surrender offer came. An order was issued to General Spaatz to continue operations as planned unless otherwise instructed.

On the afternoon of August 7 the U.S.S. *Augusta* completed a record run from Europe and entered Chesapeake Bay. As soon as the ship was moored alongside the dock at Newport News I disembarked and entered a special train which left immediately for Washington. By 11 P.M. I was back at the White House, where other members of the Cabinet were on hand to greet me and to welcome me back home. It had been a month since I left the White House, and I had traveled a total of 9,346 miles.

The Russian-Chinese negotiations were resumed shortly after the Potsdam conference when Stalin returned to Moscow. Prime Minister Soong, accompanied by the new Chinese Foreign Minister, Wang Shih-chieh, bringing further instructions from Chiang Kai-shek, went back to the Russian capital from Chungking.

Ambassador Harriman, who also had returned to his post in Moscow, was kept fully informed by Soong on the details of the talks and continued to report to me. Some of the messages had reached me on the *Augusta.*

On August 5 I instructed Secretary Byrnes, aboard the *Augusta*, to send new directions to Ambassador Harriman. I asked that Harriman tell Stalin that we believed Soong had already met the Yalta requirements. And we would request that no agreement be made involving further concessions by China, Harriman was advised through Byrnes, that might adversely affect our interests, "particularly with reference to the inclusion of the Port of Dairen in the Soviet military zone, without consultation with us. It should be recalled that President Roosevelt declined to agree to Soviet original proposal for a lease of Dairen and, insisted on its internationalization as a free port. Because of our interest in the open door policy we would be opposed to the inclusion of the Port of Dairen in the Soviet military zone or its use as a Soviet naval base."

I was not too hopeful about the renewed talks between Soong and Stalin. Ambassador Hurley in Chungking reported that the Russians had added a new demand, that China should agree not to fortify any islands for a hundred miles south of Port Arthur. The Chinese were determined to reject this new demand. On the other hand, Chiang Kai-shek had authorized Soong to agree to the inclusion in the Soviet military zone around Port Arthur of the area that had once been leased by the czarist Russian government, although he still insisted that Dairen and the connecting railroad be exempted.

Stalin accepted this formula and also agreed to the face-saving device of a Chinese-Russian military commission to supervise the port at Port Arthur, although the administration of the city and the port would be in the hands of the Russians. He insisted, however, that Dairen also had to be under a mixed commission with a Soviet official in charge of the operation of the port, and at the first conference that followed Soong's return to Moscow, Stalin also introduced a topic that had not been brought up before.

"Stalin then raised the question of 'war trophies,' " Harriman reported, "and indicated that some of the Japanese properties, including the shares of some Japanese enterprises, should be considered as Soviet war trophies in areas occupied by the Red Army. Soong inquired exactly what Stalin had in mind, but Stalin was evasive and left the matter for future discussion. This was the first time this subject has been mentioned to Soong, and it has never been raised with

us. If the Soviets define war trophies as they did in connection with Germany, including also shares of Japanese enterprises, it would be possible for the Soviets to strip Manchuria of certain of its industries and to obtain permanently complete industrial domination of Manchuria. I understand the Japanese have taken possession of and developed most of the heavy and light industries in Manchuria. I request urgent instructions as to our position on this question, particularly if Stalin should raise the matter with me. This is another case where Stalin has increased his appetite, and I recommend that we resist his demands for shares of stock of Japanese enterprises and restrict the definition of war booty to matériel that has been historically so regarded in accordance with the United States' definition submitted at Potsdam. As to reparations, I recommend that our position should be that all Japanese property whether in Manchuria or elsewhere should be available to all countries who have suffered damage by Japanese aggression to be allocated by agreement between the powers. As this been raised, I am fearful that unless we make our position plain at this time the Soviets will contend that they have the right to define unilaterally war trophies within the areas occupied by the Red Army. I have consulted Ambassador Pauley, and he concurs in these recommendations. . . ."

I was keeping a close watch on the Russian-Chinese negotiations. It was our hope that despite the long-drawn-out negotiations our two wartime allies might reach agreement. Stalin had said that Russia would not come into the war against Japan until she had concluded an agreement with China. It was for this reason that I urged Chiang Kai-shek to continue the talks in Moscow.

Without warning, while Russian-Chinese negotiations were still far from agreement, Molotov sent for Ambassador Harriman on August 8 and announced to him that the Soviet Union would consider itself at war with Japan as of August 9. This move did not surprise us. Our dropping of the atomic bomb on Japan had forced Russia to reconsider her position in the Far East. The message from Harriman informing me of this sudden switch by the Russians reached me early in the afternoon of August 8, and I promptly called a special press conference. Admiral Leahy and Secretary Byrnes were present when I met the correspondents. There were only four sentences to my announcement:

> I have only a simple announcement to make. I can't hold a regular press conference today, but this announcement is so important I thought I would like to call you in. Russia has declared war on Japan. That is all.

The following day Harriman reported further on the Russian decision:

> When Molotov informed the British ambassador and me last evening that the Soviet Union would consider itself in a state of war with Japan as of August 9 he emphasized that although at one time it was thought that this action could not take place until mid-August the Soviet Government had now strictly lived up to its promise to enter Pacific War 3 months after the defeat of Germany. In reply to an inquiry made by the British ambassador as to how the Japanese ambassador had reacted to the statement handed him at 5 o'clock, Molotov first explained that Sato was a 'kind hearted man' and that he had always had good relations with him. Molotov continued that Sato inquired as to what the Soviet statement meant with respect to the words 'to deliver the people from further sacrifices and suffering and to enable the Japanese people to avoid those dangers and destruction which Germany had undergone.' Molotov replied that the Soviet Government wished to shorten the duration of the war and decrease sacrifices. Sato then remarked that the Pacific war would not be of long duration.

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In another message Harriman reported that the Russians were not wasting any time in bringing their forces into action.

"I saw Stalin and Molotov this evening," this second message read. "Stalin said that his advance troops had already crossed the frontiers of Manchuria both from the west and the east not meeting heavy resistance on any front and had advanced 10 or 12 kilometers in some sections. The main forces were starting across the frontier as we spoke. He said that there were 3 main attacks from the west, one south towards Heilar, the second east from Outer Mongolia towards Solun, and the third, a cavalry column, through the Gobi desert toward South Manchuria. In the Vladivostok area there was one drive west toward Grodekovo. He explained that his objectives from all directions were Harbin and Changchun. He said that his forces from the north in the Khabarovsk area were being held to attack when the enemy has been compelled to weaken their forces defending that front. He said further that they had not yet attacked in Sakhalin but were prepared to do so later. In discussing the Japanese situation he said that he thought the Japanese were looking for a pretext to set up a government that would surrender and he thought that the atomic bomb might give this pretext. He showed great interest in the atomic bomb and said that it could mean the end of war and aggression but that the secret would have to be well kept. He said that they had found in Berlin laboratories in which the Germans were working on the breaking of the atom but that he did not find that they had come to any results. Soviet scientists had also been working on the problem but had not been able to solve it."

On August 9 the second atom bomb was dropped, this time on Nagasaki. We gave the Japanese three days in which to make up their minds to surrender, and the bombing would have been held off another two days had weather permitted. During those three days we indicated that we meant business. On August 7 the 20th Air Force sent out a bomber force of some one hundred and thirty B-29's, and on the eighth it reported four hundred and twenty B-29's in day and night attacks. The choice of targets for the second atom bomb was first Kokura, with Nagasaki second. The third city on the list, Niigata, had been ruled out as too distant. By the time Kokura was reached the weather had closed in, and after three runs over the spot without a glimpse of the target, with gas running short, a try was made for the second choice, Nagasaki. There, too, the weather had closed in, but an opening in the clouds gave the bombardier his chance, and Nagasaki was successfully bombed.

This second demonstration of the power of the atomic bomb apparently threw Tokyo into a panic, for the next morning brought the first indication that the Japanese Empire was ready to surrender.

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2. Harry S. Truman, *Memoirs by*: Vol. II, *Years of Trial and Hope (1946-1952)*, Garden City, New York: Doubleday & Company, Inc., 1955-1956, pp. 1-16.

CHAPTER 1

Within the first few months I discovered that being a President is like riding a tiger. A man has to keep on riding or be swallowed. The fantastically crowded nine months of 1945 taught me that a President either is constantly on top of events or, if he hesitates, events will soon be on top of him. I never felt that I could let up for a single moment.

No one who has not had the responsibility can really understand what it is like to be President, not even his closest aides or members of his immediate family. There is no end to the

chain of responsibility that binds him, and he is never allowed to forget that he is President. What kept me going in 1945 was my belief that there is far more good than evil in men and that it is the business of government to make the good prevail.

By nature not given to making snap judgments or easy decisions, I required all available facts and information before coming to a decision. But once a decision was made, I did not worry about it afterward. I had trained myself to look back into history for precedents, because instinctively I sought perspective in the span of history for the decisions I had to make. That is why I read and re-read history. Most of the problems a President has to face have their roots in the past.

Two cruel wars were behind us in which we had seen totalitarian aggressors beaten into unconditional surrender. We had sponsored and helped establish the United Nations Organization, hoping to prevent again the too often recurring plague of humanity—war. I had met with Churchill and Attlee and Stalin at Potsdam, trying to achieve closer co-operation between the three leading powers.

But in spite of these efforts relations with Russia had become strained. Victory had turned a difficult ally in war into an even more troublesome peacetime partner. Russia seemed bent upon taking advantage of war-shattered neighbors for imperialistic ends. The whole balance of power in the Far East had shifted. Most of the countries in Europe were bankrupt, millions of people were homeless and starving, and we were the only nation that could come to their help. We had already taken emergency relief measures, and we were preparing to do everything we could to avert a great human disaster.

The economic and financial burdens confronting us were staggering. But the adjustments from war to peace were being accomplished in a vigilant and orderly manner, and our economy kept going in high gear with full peacetime employment at a time when we were demobilizing millions of men. We were witnessing the transformation of the United States into a nation of unprecedented power and growing capacity.

But one event occurred in 1945 of such magnitude that it was to revolutionize our relations with the world and usher in a new era for humanity, the fruits and goals and problems of which we cannot even now fully grasp. It was the atomic bomb. With it came the secret of how to harness nuclear energy. I now had a responsibility without precedent in history. The decisions I had to make and the policies I would recommend to Congress on the use and control of atomic energy could well influence the future course of civilization. This was to be the beginning of the period of hope and many trials.

A bill for the control of atomic energy was before the Congress. This bill was the May-Johnson bill, which had been drawn up in the early days after V-J Day, and its approach was military. Its aim was to set up a kind of permanent "Manhattan District" under military control.

In the message I had sent to Congress on October 3 I strongly emphasized the peacetime uses of atomic energy, and for that reason I felt that it should not be controlled by the military. During the fall months of 1945 legislative action had been delayed by a wrangle among Senate committees as to which should properly handle bills affecting atomic power. Behind this dispute was the basic disagreement on whether the new force was primarily a military weapon or a potential source for peaceful civilian development.

The legislative dispute was finally resolved when the Senate set up a Special Committee on Atomic Energy. The chairman of this committee was Senator Brien McMahon of Connecticut, a devoted and talented public servant who deserves a great deal of credit for his legislative leadership in the shaping of the atomic program.

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On November 30 I sent a memorandum to certain officials on the handling of the atomic program, stating that I thought the May-Johnson bill should be amended to provide for civilian supremacy, and-at the same time raised with Senator McMahon the necessity for establishing civilian control. The senator agreed to seek amendment of the bill. Within a few days, however, he requested an appointment, suggesting that the Secretaries of War and of the Navy also be present. The military services felt very strongly that the control of atomic development should be under their auspices, if not under their immediate jurisdiction, and they were making strong representations to that effect to the Congress.

The meeting took place in my office on December 4. In addition to Patterson, Forrestal, and Senator McMahon, General Groves was present, along with Dr. Edward U. Condon, Director of the Bureau of Standards, and James R. Newman, counsel of the Atomic Energy Committee.

I asked each member of the group to state his position. Then I stated mine, that the entire program and operation should be under civilian control and that the government should have a monopoly of materials, facilities, and processes.

On December 20 Senator McMahon introduced S. 1717, which, in substance, contained this approach to the subject. On December 27 Secretary Patterson submitted a memorandum giving his views and those of some of his advisers in opposition to the McMahon bill. After the most careful study I replied to the Secretaries of War and of the Navy on January 23 with this memorandum, in which I insisted upon civilian control:

> I have read the Secretary of War's memorandum of December 27th, giving his view, together with those of certain members of the Interim Committee, on my proposals for specific amendments to the May-Johnson bill.
>
> After careful consideration, it is my judgment that the recommendations contained in my memorandum of November 30th should be adhered to without modification.
>
> I direct your attention to the following items of particular importance:
>
> (1) A commission established by the Congress for the control of atomic energy should be exclusively composed of civilians. This is in accord with established American tradition and has found its way into statutory provisions which expressly prohibit members of the Armed Forces on active status from serving in other Governmental posts. These provisions the May-Johnson bill seeks to modify. In my judgment, the problem of atomic energy does not justify the departure.
>
> I agree that in times of national emergency it may be desirable to call upon members of the Armed Forces to serve in administrative posts for which their experience peculiarly fits them. In such event, the Congress may, as it has in the past, pass specific enabling legislation. But I believe this to be an unusual step, to be invoked by the Congress only when the national interest or safety demands it.
>
> (2) An absolute Government monopoly of ownership, production and processing of all fissionable materials appears to me imperative. *Fissionable* materials are, of course, to be distinguished from *source* materials from which fissionable materials may be derived. By fissionable materials, I mean such as U235, or Plutonium or any substance enriched in these beyond its natural state.
>
> I recognize that administering close controls of fissionable materials may in some respects prove difficult. But the difficulty is small compared to the advantages of government monopoly in dealing with international problems—or compared to the danger of permitting anyone other than the Government to own or produce these crucial substances, the use of which affects the safety of the entire Nation. The benefits of atomic energy are the heritage of the people; they should be distributed as widely as possible. Government monopoly alone will assure both the material safety and the maximum utilization of atomic energy for the public welfare.
>
> (3) Consistent with these principles I believe it essential that atomic energy devices be made fully available for private patents, and regulation of royalty fees to insure their reasonableness. These

provisions will assure widespread distribution of the benefits of atomic energy while preserving the royalty incentive to maintain the interest of private enterprise.

While I have covered only three of the major points in my memorandum of November 30th, I deem adherence to all the recommendations in that memorandum to be essential.

The Chairman of the Military Affairs Committee of the House and the leaders in the House should be advised that the Administration desires recommitment of the May-Johnson bill for purposes of amendment or, failing this, that no steps be taken to alter the present status of the bill in the House.

It is my wish, furthermore, that in appearing before Congressional committees or in discussions with Members of Congress relative to atomic energy legislation officials of the Administration present views not inconsistent with the points given in my memorandum of November 30th and reaffirmed herein.

H. S. T.

Civilian control of atomic energy faced many obstacles. Proponents of military control had many friends in the Congress, and Senator McMahon had a difficult time gathering support for his measure. On February I he spent nearly two hours with me at the White House discussing his difficulties.

In order to support the McMahon bill publicly, I gave the senator this letter and had it released for publication:

February 1, 1946

My dear Senator McMahon:

You have requested my views on S. 1717, a bill for the domestic development and control of atomic energy. I wish to give you my thoughts at this time because I consider the subject of paramount importance and urgency, both from the standpoint of our welfare at home and that of achieving a durable peace throughout the world.

I appreciate the thorough and impartial manner in which atomic energy hearings have been held in your Committee. I believe that the hearings, in keeping with democratic tradition, have aided the people in obtaining a clearer insight into the problems which such legislation must meet.

You will recall that I sent a special message to the Congress on October 3, 1945, calling for legislation to fix a policy for the domestic control of atomic energy. Since then I have given considerable time to the further study of this most difficult subject. I have had the advantage of additional technical information and expressions of public opinion developed at the hearings. With this background I feel prepared to recommend in greater detail than before what I believe to be the essential elements of sound atomic energy legislation: [This letter then set forth in the same order the three points made in the foregoing memorandum to the Secretaries of War and Navy, in approximately the same language. It then continued:]

4. In my message of October 3rd, I wrote:

"Our science and industry owe their strength to the spirit of free inquiry and the spirit of free enterprise that characterize our country. . . . [This] is our best guaranty of maintaining the preeminence in science and industry upon which our national well-being depends."

Legislation in this field must assure genuine freedom to conduct independent research and must guarantee that controls over the dissemination of information will not stifle scientific progress.

Atomic energy legislation should also insure coordination between research activities of the Commission and those of the proposed National Science Foundation, now under consideration by the Congress.

5. Each of the foregoing provisions for domestic control of atomic energy will contribute materially to the achievement of a safe, effective international arrangement making possible the ultimate use of atomic energy for exclusively peaceful and humanitarian ends. The Commission should be in a position to carry out at once any international agreements relating to inspection, control of the

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production of fissionable materials, dissemination of information, and similar areas of international action.

I feel that it is a matter of urgency that sound domestic legislation on atomic energy be enacted with utmost speed. Domestic and international issues of the first importance wait upon this action.

To your Committee, pioneers in legislation of vast promise for our people and all people, there beckons a place of honor in history.

Sincerely,
Harry S. Truman

The formulation of a plan for the international control of atomic energy had in the meantime been referred to a special governmental committee which Secretary Byrnes had appointed.

The State of the Union message of January 14 repeated our desire to develop effective control through the United Nations. The delegation which I had sent to the first formal session of the General Assembly of the United Nations in London in January was under instructions to work for the establishment of a United Nations Commission on Atomic Energy. This was in keeping with the agreements reached at Moscow the preceding month.

The plan for such a commission was put before the General Assembly by the British as the host country, was fully supported by our delegation, and was adopted on January 24. It was agreed that the first meeting of the new Commission should be held in New York on June 14, 1946.

While the United Nations deliberated on the establishment of an agency for the discussion of atomic energy controls, a committee appointed by the Secretary of State worked out a plan for such controls which might be placed before the U. N. Commission when it convened.

This committee consisted of five members. The Under Secretary of State, Dean Acheson, was designated as chairman, and with him served John J. McCIoy, former Assistant Secretary of War, and three men most directly connected with the development of the bomb, Dr. Vannevar Bush, Dr. James B. Conant, and Major General Leslie R. Groves.

Working with and for the committee was a board of consultants whose job it was to analyze and appraise all facts pertinent to the problem of international control and to formulate proposals. David E. Lilienthal, chairman of the Tennessee Valley Authority, was the chairman of this group. The members were Chester I. Barnard, president of the New Jersey Telephone Company; Dr. J. Robert Oppenheimer; Dr. Charles Allen Thomas, vice-president and technical director of the Monsanto Chemical Company; and Harry A. Winne, vice-president of the General Electric Company.

This board did an outstanding job. It examined every aspect of the problem thoroughly and conscientiously. Its report was unanimous endorsed by the parent committee. It is usually referred to as the Acheson-Lilienthal Report and is a great state paper.

I received the report from Secretary Byrnes on March 21. By that time a number of other developments had taken place that had a bearing on the problem of atomic energy control.

On March 8 Senator McMahon had come to the White House to report that new difficuIties were in the offing for the atomic energy bill that he had introduced. Senator Vandenberg was sponsoring an amendment to the bill that would set up a Military Liaison Board which, in effect, would duplicate the proposed Atomic Energy Commission. It would have access to all matters before the Commission, would have the right to insist on consultation with the Commission whenever it desired, and would have the right to appeal to the President any action of the Commission which it believed would "affect the National Defense."

On March 12 the Senate Atomic Energy Committee had approved this amendment, McMahon being the only senator to vote against it. The following day a slightly changed version was adopted by the same margin, again McMahon casting the sole negative vote.

This amendment would have had the effect of defeating the principle of civilian supremacy, and under it the Commission's work would have been subject to the veto of the military. The argument for this military veto was based on the premise that the preservation of the national security is primarily the responsibility of the armed forces. But this is a wrong assumption. The preservation of the nation's safety and defense is an organic and sweeping responsibility that extends to all branches and departments of the government; and only one of its many phases is assigned to the military departments.

I put it in these words to a press conference on March 14:

> "I don't think there is a clear understanding by the public, or even in Congress, on what is meant by civilian control of that board. I have tried to make that perfectly clear in my letter of February 2nd. The idea is that the military, of course, has an important part to play and should be consulted, but it is a mistake to believe that only the military can guard the national security. The full responsibility for a balanced and forceful development of atomic energy, looking toward the national economic good, national security, and a firm, clear position toward other nations and world peace, should rest with the civilian group directly responsible to the President. Now the President is the Commander in Chief of the Armed Forces of the United States in the first place; and the civilian board under him would in no way hamper the military in their proper function."

On March 16 I conferred with Secretary of State Byrnes on the possibility that Congress might pass an atomic energy law that would undercut our efforts to bring about international co-operation in the field of atomic power. We had to be in a position where we could put our plan for international control before the United Nations without being handicapped by a domestic law that would have made it impossible for us to participate.

Byrnes advised me that the committee was ready to report any day. He suggested that we appoint a spokesman who would command respect both at home and abroad. Bernard M. Baruch seemed to me to be the logical man, and for several reasons. Not the least important of these was that Baruch enjoyed considerable esteem in the Senate. His association with the administration's plan for the control of atomic energy might help remove some of the opposition to the McMahon bill in Congress. Baruch had also succeeded, over the years, in forming many friendships abroad, including that of Winston Churchill, and during a long life he had acquired the prestige of an "elder statesman." I called on him in the expectation that he would also add weight to the proposal we were about to put before the world.

The Baruch appointment was announced on March 18 and was received very favorably by the press. On the same day my regular weekly conference with the "Big Four" leaders of Congress was devoted exclusively to the McMahon bill. I explained the reasons for the bill as originally drafted and said that I would not accept a law without civilian control.

When Byrnes brought me a final draft of the Acheson-Lilienthal Report, I sat down at once to study it. By some unauthorized means, however, this report fell into the hands of the press. This upset Baruch, and he asked to see me. When he came, he handed me a letter:

March 26, 1946

My dear Mr. President:

I was, of course, very much gratified that you should have expressed such great confidence in me as to appoint me the United States representative on the United Nations Atomic Energy Commission. I do not underestimate either the honor or the responsibility but, as I have become more familiar with the situation, there are certain elements of it which are causing me concern, and which

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I, therefore, want to discuss with you. As I understand my duties and authority, they consist presently solely of the obligation of representing United States policy on atomic energy, as communicated to me by you directly or through the Secretary of State, before the United Nations Organization. I see nowhere any duty or responsibility on me to participate in the formation of that policy.

This situation has been brought very forcibly to my attention by the press announcements of the report rendered by Mr. Acheson's Committee. I do not underestimate the effect of this publication in the United States or in the world at large, and while I have not had an opportunity to examine the report with care and cannot state my own definite views with respect to it, the letter from Secretary Byrnes to me transmitting the report states that it was unanimously recommended by a Committee headed by the Under Secretary of State. This brings the report pretty close to the category of the United States Government policy.

I have no doubt that the public feels that I am going to have an important relation to the determination of our atomic energy policy. There is no legal basis for this view and now that the Under Secretary of State's Committee Report has been published, the determination of policy will be greatly affected by the contents of this report. Even the superficial and incomplete examination of the subject that I have been able to make in the last few days convinces me that this report is likely to be the subject of considerable and rather violent differences of opinion. Its publication, which I understand to have been unauthorized, does not render the situation any less difficult.

These are the things that have been bothering me, and I wanted to talk them over with you before coming to a final conclusion myself as to whether, in the circumstances, I can be useful to you. I will need a little more time to reflect. As it presently stands, I think that embarrassment all around would be avoided if you would ask Chairman Connally of the Foreign Relations Committee to postpone any action on confirmation of my appointment until I have had a little more time to think things over.

Respectfully yours,
Bernard M. Baruch

I explained to Mr. Baruch that, in the first place, the Acheson/Lilienthal Report was very plainly marked as a working paper and not as an approved policy document. I also informed him that whatever policy he would be asked to represent before the United Nations would have to be a policy approved by me. I pointed out that, under the law, all representatives of the United States at the United Nations were under the supervision of the Secretary of State. Of course, I told him, the Secretary of State would probably request his aid in the preparation of a policy proposal for my approval, but I had no intention of placing him in a role different from other delegates to the United Nations.

Mr. Baruch then went to see Secretary Byrnes, and Byrnes later informed me that he had given Baruch a letter outlining his duties:

April 19, 1946

Dear B. M.:

Summarizing for the record our discussion of April 18 in which Mr. Hancock and Mr. Searls participated, I have asked you to give me the benefit of your advice when, with the President, I attempt to determine the policy of the United States which is to guide you in your representation of the United States on the United Nations Atomic Energy Commission.

You have pointed out that under the statute you are not called upon to determine policy. The fact is that under the law the President determines the policy and transmits such policy through me to the United States representative on the Commission. However, as a practical matter, I know that the President will ask for my views in determining this policy and I, in turn, will ask for your views. That is why I had asked you to be good enough to fully explore the subject.

I have advised you that I am favorably impressed by the report which has come to be called the State Department report and which was prepared under the direction of Mr. Acheson. I have, however, advised you that I am not of the opinion that it is the last word on the subject and, on the contrary, that I shall give careful consideration to any views that may be presented by you after you consider the problem.

I have suggested that submission of your advice should be informal. I hope that you will give me the benefit of your advice from time to time as your study progresses. I suggest this because from time to time I may be called upon to discuss the matter with the President. I would want to give to him, or have you join me in giving to him, any views we thought might be helpful to him in his consideration of the subject.

There is to be no formal report. The decision as to policy is the President's. You and I will advise him just as I advise him on many other matters. While it is the duty of the President to determine policy, it is my thought that when determined it should not be made public by him but should be transmitted to you and you, as representative of the United States, should announce at the meeting of the Commission what is the policy of this Government. However, this will be for the President to decide.

Once the Commission is in operation, there must be close cooperation between you and the Secretary of State. Matters will arise which cannot be foreseen and you must be given discretion to exercise your judgment as to all such matters, only avoiding positions that would be in conflict with the President's policy.

I do not believe that you will have any difficulty about these matters. You will be acting toward me just as I act toward the President. I know what his basic policies are. Knowing that, I do not hesitate to take positions as to matters which could not be anticipated. If they are matters of great importance I try to communicate with him. We have never had any difference in views that was not quickly reconciled. I am sure that will be your experience. If you need any help from the State Department I am sure it will be granted without question. Should there ever be a question this letter is your authority to call upon the officials of the Department of State for assistance.

I expect to leave Washington Tuesday morning. Good luck to you!

Sincerely yours,
James F. Byrnes

Baruch, who is usually referred to as an "adviser to Presidents," had, of course, full knowledge of the President's responsibility for national policy. His concern, in my opinion, was really whether he would receive public recognition. He had always seen to it that his suggestions and recommendations, not always requested by the President, would be given publicity. Most Presidents have received more advice than they can possibly use. But Baruch is the only man to my knowledge who has built a reputation on a self-assumed unofficial status as "adviser."

I had asked him to help his government in a capacity of my choosing. I had no intention of having him tell me what his job should be. I made that clear to him, in a very polite way, and so did Byrnes, as his letter indicates.

Mr. Baruch's principal contribution to the atomic energy program was that he transformed the Acheson-Lilienthal Report from a working paper into a formal, systematic proposal and that he added a section that called for sanctions against any nation violating the rules. The American plan was put before the United Nations Commission by Baruch on June 14. Within a matter of hours it became evident that the U.S.S.R. had a proposal of its own, and one that was sharply in conflict with the American suggestion.

In the month that followed, Baruch and his associates, notably John Hancock, Ferdinand Eberstadt, and Dr. Richard C. Tolman, presented details of the American proposals to the sev-

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eral committees set up by the U. N. Commission. Russian and Polish opposition was evident. In substance, what the Russians wanted was a plan that would provide for an agreement not to use atomic weapons, for the cessation of bomb production, and for the destruction of all stockpiles. This amounted to a demand that we destroy our atomic bombs and, if we agreed to all this, then the Russians would be willing to discuss arrangements for the exchange of scientific information and the formation of international controls.

Our plan provided for the setting up of immediate controls over raw materials out of which fissionable materials could be made. Only when such controls were established would we consider disposing of our stockpile of bombs.

If we accepted the Russian position, we would be deprived of everything except their promise to agree to controls. Then, if the Russians should launch an atomic armament race, our present advantage and security gained by our discovery and initiative would be wiped out. As I wrote to Baruch on July 10, "We should not under any circumstances throw away our gun until we are sure the rest of the world can't arm against us."

The United Nations Commission eventually adopted, over the objections of Poland and Russia, what was substantially the American plan. The Commission's report was sent to the Security Council. There, backed by the use of the veto, Russia was able to block all further action.

The possibility that Russia would not cooperate in an international control scheme had been anticipated by us. We were prepared, in any event, to safeguard our own national interest.

At the time the British expressed concern over the McMahon bill. They said that this bill would deprive them of the opportunity to share our knowledge and "know-how" and the advantages derived from the years of wartime collaboration with us on the bomb project. Our ambassador to London, Averell Harriman, reported to me that Prime Minister Attlee felt that if the McMahon bill passed, Britain would be forced to undertake the development of atomic energy production on her own. Attlee said he feared the McMahon bill would prohibit the disclosure or sharing of atomic secrets with any foreign power, including the British. The British government took the position that, until such a time as U.N. control might become effective, the British should either have atomic weapons made available to them or at least be supplied with the data necessary to start their own production.

The Combined Policy Committee, which was the British-American body that handled such questions, came to a complete deadlock on April 15, and on the following day Attlee sent me a long message in which he sought to justify the British stand.

The agreed declaration of November 15, 1945, he said, stated that it was our desire that there should be "full and effective cooperation in the field of atomic energy between the United States, the United Kingdom and Canada." This, he thought, could not mean less than full interchange of information and a fair division of the material. The declaration, Attlee said, contained nothing about the sharing of information among ourselves and the clear indication was that this was already provided for. The wartime arrangements under which the major share of the development work and the construction and operation of fullscale plants were carried out in the United States had naturally meant that technological and engineering information had accumulated in our hands. Now, if , there was to be full and effective co-operation between us, Attlee declared, it was essential that this information be shared. The British Prime Minister proposed that the Combined-Policy Committee should make a further study of the question.

I replied to Attlee on April 20:

"The Secretary of State has informed me of the discussion in the Combined Policy Committee with reference to the request of the representatives of the United Kingdom that they be furnished with full information as to the construction and operation of the atomic energy plants in this country in order that they may proceed to construct a plant somewhere in the United Kingdom.

"The Secretary advises me that the request is based upon the construction placed upon the memorandum dated November 16, 1945, signed by Harry S. Truman, C. R. Attlee and Mackenzie King. That memorandum reads as follows:

"QUOTE 1. We desire that there should be full and effective cooperation in the field of atomic energy between the United States, the United Kingdom and Canada.

"QUOTE 2. We agree that the Combined Policy Committee and the Combined Development Trust should be continued in a suitable form.

"QUOTE 3. We request the Combined Policy Committee to consider and recommend to us appropriate arrangements for this purpose. END QUOTE.

"I would regret it very much if there should be any misunderstanding by us as to this memorandum.

"I think it is agreed by all of us that during the war under the Quebec Agreement the United States was not obligated to furnish to the United Kingdom in the postwar period the designs and assistance in construction and operation of plants necessary to the building of a plant. Therefore, the question is whether this situation was changed and such an obligation assumed by the United States under the language of the memorandum above quoted.

"The language 'full and effective cooperation' is very general. We must consider what was the intention of those who signed the memorandum. I must say that no one at any time informed me that the memorandum was proposed with the intention of having the United States obligate itself to furnish the engineering and operation assistance necessary for the construction of another atomic energy plant. Had that been done I would not have signed the memorandum.

"That such a change in our obligation was not intended at the time is indicated by the working paper prepared by Sir John Anderson and General Groves, a few hours after the signing of a memorandum by you and me. I admit that I was not aware of the existence of this paper, but it shows conclusively that even in the minds of those gentlemen who prepared the agreement we signed, the words 'full and effective cooperation' applied only to the field of basic scientific information and were not intended to require the giving of information as to construction and operation of plants whenever it was requested.

"Paragraph five of that memorandum of intention reads as follows:

"QUOTE. There shall be full and effective cooperation in the field of basic scientific research among the three countries. In the field of development, design, construction, and operation of plants such cooperation, recognized as desirable in principle, shall be regulated by such *ad hoc* arrangements as may be approved from time to time by the Combined Policy Committee as mutually advantageous. END QUOTE.

"As to our entering at this time into an arrangement to assist the United Kingdom in building an atomic energy plant, I think it would be exceedingly unwise from the standpoint of the United Kingdom as well as the United States.

"On November 15, the day prior to the signing of the memorandum first above referred to, the United Kingdom, Canada and the United States issued jointly a declaration of our intention to request the United Nations to establish a commission to control the production of atomic energy so as to prevent its use for military purposes. Our action led to the adoption later by the

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General Assembly of a resolution creating a commission for that purpose. I would not want to have it said that on the morning following the issuance of our declaration to bring about international control we entered into a new agreement, the purpose of which was to have the United States furnish the information as to construction and operation of plants which would enable the United Kingdom to construct another atomic energy plant. No such purpose was suggested by you or thought of by me.

"We were inspired to issue our declaration by the demands of people the world over that there should be some international control of atomic energy. Ever since, we have been working toward that goal. . . ."

The British Prime Minister did not answer until June 7, when he cabled that he had delayed his reply in order to discuss the matter with the Canadian Prime Minister, Mackenzie King. It was a long summary of the effort of British scientists who, in 1940 and 1941, had been among the first, Attlee said, to explore the military possibilities of atomic energy. In October 1941, President Roosevelt had proposed to Churchill that efforts be co-ordinated. The British had agreed to assist the enterprise in the United States "in the confident belief that the experience and knowledge gained in America would be made freely available," the British Prime Minister said, enabling the British to concentrate on radar and jet propulsion.

Attlee claimed that at Quebec it had been agreed there should be a complete exchange of ideas and information, and because of this the interchange of information in the field of design and construction of large-scale plants was not ruled out. It had been left to the President of the United States, he said, to specify the terms on which any postwar advantages of an industrial or a commercial character should be dealt with as between the United States and Great Britain. Attlee said that British scientists continued their contribution until the atomic bomb was dropped, and at that point the British had considered development of atomic energy at home, expecting to be able to "make use of the experience which had been gained up to that point in the joint enterprise." When war came to an end, the British were told that until new arrangements were concluded the supply of information from the United States must stop, and for that reason, the Prime Minister said, he had gone to Washington to see that the wartime co-operation be continued.

"I was very much reassured," he said in his message, "when you agreed that this should be so and that the Combined Policy Committee should be asked to recommend arrangements to that end."

Attlee contended that he could find no support in the document drawn up by that policy committee that there was no obligation to exchange information about the construction of large-scale plants. He referred to a draft agreement drawn up by a subcommittee of the Combined Policy Committee providing continuance of full and effective co-operation in the exchange of information. "We made it clear in the discussions that our own program would include the construction of large-scale plants," he added. But when the subcommittee report had been submitted to the Combined Policy Committee, it came as a surprise to him, Attlee went on to say, "to find that your government was not prepared to enter into any agreement, not to proceed on the basis of the agreements previously reached between us, nor yet to agree that cooperation should, in fact, continue by administrative action."

Attlee declared he could not agree with the argument that to continue such co-operation would be inconsistent with the public declaration on the control of atomic energy "which you and Mackenzie King and I issued in November. That our three governments stand on a special relationship to one another in this field is a matter of record and was in fact the reason why we took the initiative in issuing the declaration. It is surely not inconsistent with its purpose that

the cooperation begun during the war should continue during the peace unless and until it can be replaced by a wider system." The Prime Minister said that in the one important field of joint control of raw materials co-operation was still continuing, adding, "Why then should we abandon all further pooling of information?"

"I can see nothing in the Washington declaration," Attlee said, "or in the assembly resolution, which requires us to dissolve our partnership either in the exchange of information or in the control of raw materials, until it can be merged in a wider partnership. I should be sorry to think that you did not agree with this view." He closed his long cable by urging that the continuing co-operation over raw materials be balanced by exchange of information which "will give us, with all proper precautions in regard to security, that full information to which we believe that we are entitled, both by the documents and by the history of our common efforts in the past."

In view of developments in Congress I was unable to send an immediate reply to Attlee's message. There was no certainty that the McMahon bill would gain final approval or whether some version of the original May-Johnson proposal would pass. It was not possible for me to make any statement on policy to Great Britain until the Congress had acted. But, in any case, it was already apparent that, whatever bill the Congress passed, it would seriously hamper and restrict our co-operation with the British in the atomic field. Congress finally passed the McMahon bill in amended form, and I signed it on August 1, 1946. The Atomic Energy Commission, which was established by this bill, took up its duties on January 1, 1947. As its first chairman I selected David E. Lilienthal, who had done such an outstanding job as chairman of the Tennessee Valley Authority. Lilienthal had already acquired knowledge of the problems of atomic energy through his work as chairman of the board of consultants to the Acheson Committee.

The United States was now ready to embark on a program of planned development of atomic energy, for the security of the nation until international control became fact, and for the general benefit of all mankind.

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3. Winston S. Churchill, *Triumph and Tragedy*, Vol. VI of *The Second World War*, Boston: Houghton Mifflin Company, 1953, pp. 637-646 and 669-670.

On July 17, world-shaking news had arrived. In the afternoon Stimson called at my abode and laid before me a sheet of paper on which was written, "Babies satisfactorily born." By his manner I saw something extraordinary had happened. "It means," he said, "that the experiment in the New Mexican desert has come off. The atomic bomb is a reality." Although we had followed this dire quest with every scrap of information imparted to us, we had not been told beforehand, or at any rate I did not know, the date of the decisive trial. No responsible scientist would predict what would happen when the first full-scale atomic explosion was tried. Were these bombs useless or were they annihilating? Now we knew. The "babies" had been "satisfactorily born." No one could yet measure the immediate military consequences of the discovery, and no one has yet measured anything else about it.

Next morning a plane arrived with a full description of this tremendous event in the human story. Stimson brought me the report. I tell the tale as I recall it. The bomb, or its equivalent, had been detonated at the top of a pylon 100 feet high. Everyone had been cleared away for ten miles round, and the scientists and their staffs crouched behind massive concrete shields

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and shelters at about that distance. The blast had been terrific. An enormous column of flame and smoke shot up to the fringe of the atmosphere of our poor earth. Devastation inside a one-mile circle was absolute. Here then was a speedy end to the Second World War, and perhaps to much else besides.

The President invited me to confer with him forthwith. He had with him General Marshall and Admiral Leahy. Up to this moment we had shaped our ideas towards an assault upon the homeland of Japan by terrific air bombing and by the invasion of very large armies. We had contemplated the desperate resistance of the Japanese fighting to the death with Samurai devotion, not only in pitched battles, but in every cave and dug-out. I had in my mind the spectacle of Okinawa island, where many thousands of Japanese, rather than surrender, had drawn up in line and destroyed themselves by hand-grenades after their leaders had solemnly performed the rite of *hara-kiri*. To quell the Japanese resistance man by man and conquer the country yard by yard might well require the loss of a million American lives and half that number of British — or more if we could get them there: for we were resolved to share the agony. Now all this nightmare picture had vanished. In its place was the vision — fair and bright indeed it seemed — of the end of the whole war in one or two violent shocks. I thought immediately myself of how the Japanese people, whose courage I had always admired, might find in the apparition of this almost supernatural weapon an excuse which would save their honour and release them from their obligation of being killed to the last fighting man.

Moreover, we should not need the Russians. The end of the Japanese war no longer depended upon the pouring in of their armies for the final and perhaps protracted slaughter. We had no need to ask favours of them. A few days later I minuted to Mr. Eden: "It is quite clear that the United States do not at the present time desire Russian participation in the war against Japan." The array of European problems could therefore be faced on their merits and according to the broad principles of the United Nations. We seemed suddenly to have become possessed of a merciful abridgment of the slaughter in the East and of a far happier prospect in Europe. I have no doubt that these thoughts were present in the minds of my American friends. At any rate, there never was a moment's discussion as to whether the atomic bomb should be used or not. To avert a vast, indefinite butchery, to bring the war to an end, to give peace to the world, to lay healing hands upon its tortured peoples by a manifestation of overwhelming power at the cost of a few explosions, seemed, after all our toils and perils, a miracle of deliverance.

British consent in principle to the use of the weapon had been given on July 4, before the test had taken place. The final decision now lay in the main with President Truman, who had the weapon; but I never doubted what it would be, nor have I ever doubted since that he was right. The historic fact remains, and must be judged in the after-time, that the decision whether or not to use the atomic bomb to compel the surrender of Japan was never even an issue. There was unanimous, automatic, unquestioned agreement around our table; nor did I ever hear the slightest suggestion that we should do otherwise.

It appeared that the American Air Force had prepared an immense assault by ordinary air-bombing on Japanese cities and harbours. These could certainly have been destroyed in a few weeks or a few months, and no one could say with what very heavy loss of life to the civilian population. But now, by using this new agency, we might not merely destroy cities, but save the lives alike of friend and foe.

* * * * *

A more intricate question was what to tell Stalin. The President and I no longer felt that we needed his aid to conquer Japan. His word had been given at Teheran and Yalta that Soviet

Russia would attack Japan as soon as the German Army was defeated, and in fulfilment of this a continuous movement of Russian troops to the Far East had been in progress over the Siberian Railway since the beginning of May. In our opinion they were not likely to be needed, and Stalin's bargaining power, which he had used with such effect upon the Americans at Yalta, was therefore gone. Still, he had been a magnificent ally in the war against Hitler, and we both felt that he must be informed of the great New Fact which now dominated the scene, but not of any particulars. How should this news be imparted to him? Should it be in writing or by word of mouth? Should it be at a formal and special meeting, or in the course of our daily conferences, or after one of them? The conclusion which the President came to was the last of these alternatives. "I think," he said, "I had best just tell him after one of our meetings that we have an entirely novel form of bomb, something quite out of the ordinary, which we think will have decisive effects upon the Japanese will to continue the war." I agreed to this procedure.

The following is a note which I made for the Cabinet at the time:

PRIME MINISTER'S NOTE FOR THE WAR CABINET

18 July 45

The President showed me telegrams about the recent experiment, and asked what I thought should be done about telling the Russians. He seemed determined to do this, but asked about the timing, and said he thought that the end of the Conference would be best. I replied that if he were resolved to tell it might well be better to hang it on the experiment, which was a new fact on which he and we had only just had knowledge. Therefore he would have a good answer to any question, "Why did you not tell us this before?" He seemed impressed with this idea, and will consider it.

On behalf of His Majesty's Government I did not resist his proposed disclosure of the simple fact that we have this weapon. He reiterated his resolve at all costs to refuse to divulge any particulars. . . .

* * * * *

Meanwhile the devastating attack on Japan had continued from the air and the sea. Among the principal targets were the remnants of the Japanese Fleet, now dispersed for shelter in the island sea. One by one the big ships were picked out, and by the end of July the Japanese Navy had virtually ceased to exist.

The homeland was in chaos and on the verge of collapse. The professional diplomats were convinced that only immediate surrender under the authority of the Emperor could save Japan from complete disintegration, but power still lay almost entirely in the hands of a military clique determined to commit the nation to mass suicide rather than accept defeat. The appalling destruction confronting them, made no impression on this fanatical hierarchy, who continued to profess belief in some miracle which would turn the scale in their favour.

In several lengthy talks with the President alone, or with his advisers present, I discussed what to do. Earlier in the week Stalin had told me privately that as his party was leaving Moscow an unaddressed message had been delivered to him through the Japanese Ambassador. It was presumably meant for either himself or President Kalinin or other members of the Soviet Government, and was from the Japanese Emperor. It stated that Japan could not accept "unconditional surrender," but might be prepared to compromise on other terms. Stalin had replied that as the message contained no definite proposals the Soviet Government could take no action. I explained to the President that Stalin had not wished to tell him direct lest he might think the Russians were trying to influence him towards peace. In the same way I thought we should abstain from saying anything which would make us seem at all reluctant to go on with

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the war against Japan for as long as the United States thought fit. However, I dwelt upon the tremendous cost in American and to a smaller extent in British life if we enforced "unconditional surrender" upon the Japanese. It was for him to consider whether this might not be expressed in some other way, so that we got all the essentials for future peace and security and yet left them some show of saving their military honour and some assurance of their national existence, after they had complied with all safeguards necessary for the conqueror. The President replied bluntly that he did not think the Japanese had any military honour after Pearl Harbour. I contented myself with saying that at any rate they had something for which they were ready to face certain death in very large numbers, and this might not be so important to us as it was to them. He then became quite sympathetic, and spoke, as had Mr. Stimson, of the terrible responsibilities that rested upon him for the unlimited effusion of American blood.

I felt there would be no rigid insistence upon "unconditional surrender," apart from what was necessary for world peace and future security and for the punishment of a guilty and treacherous deed. Mr. Stimson, General Marshall, and the President were evidently searching their hearts, and we had no need to press them. We knew of course that the Japanese were ready to give up all conquests made in the war.

Eventually it was decided to send an ultimatum calling for an immediate unconditional surrender of the armed forces of Japan. This document was published on July 26.

ULTIMATUM CALLING FOR IMMEDIATE
UNCONDITIONAL SURRENDER

26 July 45

We the President of the United States, the President of the National Government of the Republic of China, and the Prime Minister of Great Britain, representing the hundreds of millions of our countrymen, have conferred and agree that Japan shall be given an opportunity to end the war.

2. The prodigious land, sea, and air forces of the United States, the British Empire, and China, many times reinforced by their armies and air fleets from the West, are poised to strike the final blows upon Japan. This military power is sustained and inspired by the determination of all the Allied nations to prosecute the war against Japan until she ceases to resist.

3. The result of the futile and senseless German resistance to the might of the aroused free peoples of the world stands forth in awful clarity as an example to the people of Japan.

The might that now converges on Japan is immeasurably greater than that which, when applied to the resisting Nazis, necessarily laid waste the lands, the industry, and the method of life of the whole German people. The full application of our military power, backed by our resolve, will mean the inevitable and complete destruction of the Japanese forces, and just as inevitably the utter devastation of the Japanese homeland.

4. The time has come for Japan to decide whether she will continue to be controlled by those self-willed militaristic advisers, whose unintelligent calculations have brought the Empire of Japan to the threshold of annihilation, or whether she will follow the path of reason.

5. The following are our terms. We shall not deviate from them. There are no alternatives. We shall brook no delay.

6. There must be eliminated for all time the authority and influence of those who have deceived and misled the people of Japan into embarking on world conquest, for we insist that a new order of peace, security, and justice will be impossible until irresponsible militarism is driven from the world.

7. Until, such a new order is established and until there is convincing proof that Japan's war-making power is destroyed points in Japanese territory designated by the Allies will be occupied to secure the achievement of the basic objectives we are here setting forth.

8. The terms of the Cairo declaration shall be carried out, and Japanese sovereignty shall be limited to the islands of Honshu, Hokkaido, Kyushu, Shikoku, and such minor islands as we determine.

9. The Japanese military forces after being completely disarmed shall be permitted to return to their homes, with the opportunity of leading peaceful and productive lives.

10. We do not intend that the Japanese shall be enslaved as a race nor destroyed as a nation, but stern justice will be meted out to all war criminals, including those who have visited cruelties upon our prisoners. The Japanese Government shall remove all obstacles to the revival and strengthening of democratic tendencies among the Japanese people. Freedom of speech, of religion, and of thought, as well as respect for fundamental human rights, shall be established.

11. Japan shall be permitted to maintain such industries as will sustain her economy and allow of the exaction of just reparations in kind, but not those industries which would enable her to re-arm for war.

To this end access to, as distinguished from control of, raw materials shall be permitted. Eventual Japanese participation in world trade relations shall be permitted.

12. The occupying forces of the Allies shall be withdrawn from Japan as soon as these objectives have been accomplished, and there has been established, in accordance with the freely expressed will of the Japanese people, a peacefully inclined Government.

13. We call upon the Government of Japan to proclaim now the unconditional surrender of all the Japanese armed forces, and to provide proper and adequate assurances of their good faith in such action. The alternative for Japan is complete and utter destruction.

These terms were rejected by the military rulers of Japan, and the United States Air Force made its plans accordingly to cast one atomic bomb on Hiroshima and one on Nagasaki.

We agreed to give every chance to the inhabitants. The procedure was developed in detail. In order to minimise the loss of life eleven Japanese cities were warned by leaflets on July 27 that they would be subjected to intensive air bombardment. Next day six of them were attacked. Twelve more were warned on July 31, and four were bombed on August 1. The last warning was given en August 5. By then the Superfortresses claimed to have dropped a million and a half leaflets every day and three million copies of the ultimatum. The first atomic bomb was not cast till August 6.

* * * * *

The closing scenes of the war against Japan took place after I left office, and I record them only briefly. On August 9 the Hiroshima bomb was followed by a second, this time on the city of Nagasaki. Next day, despite an insurrection by some military extremists, the Japanese Government agreed to accept the ultimatum, provided this did not prejudice the prerogative of the Emperor as a sovereign ruler. The Allied Governments, including France, replied that the Emperor would be subject to the Supreme Command of the Allied Powers, that he should authorise and ensure the signature of the surrender, and that the armed forces of the Allies would remain in Japan until the purposes set forth at Potsdam had been achieved. These terms were accepted on August 14, and Mr. Attlee broadcast the news at midnight.

The Allied fleets entered Tokyo Bay, and on the morning of September 2 the formal instrument of surrender was signed on board the United States battleship *Missouri.* Russia had declared war on August 8, only a week before the enemy's collapse. None the less she claimed her full rights as a belligerent.

* * * * *

We could brook no delay in enforcing the capitulation. Malaya, Hong Kong, and the greater part of the Dutch East Indies still remained in enemy hands, and elsewhere there were isolated

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forces who might ignore the Emperor's command and fight on. The occupation of these vast territories was thus a matter of urgency. After his Burma campaign Mountbatten had been preparing to liberate Malaya, and everything was in train for a landing near Port Swettenham. This took place on September 9. Other ports were occupied early in September, without fighting, and on September 12 Mountbatten held a surrender ceremony at Singapore.

A British officer, Admiral Harcourt, reached Hong Kong on August 30, and accepted the formal surrender of the island on September 16.

* * * * *

There were some in America who believed that Japan's downfall could have been achieved more economically by a greater use of air-power from bases in China and possibly Siberia. They maintained that her sea communications could have been severed and her power of resistance in the homeland destroyed just as effectively by air action alone, without a long and costly approach by sea as a prelude to invasion. The more advanced exponents of air-power maintained that political objectives elsewhere, in Burma, Malaya, and the East Indies, might have been renounced for the time being and could have been achieved without fighting once the. air battle had been won. The American Chiefs of Staff had rejected these ideas.

It would be a mistake to suppose that the fate of Japan was settled by the atomic bomb. Her defeat was certain before the first bomb fell, and was brought about by overwhelming maritime power. This alone had made it possible to seize ocean bases from which to launch the final attack and force her metropolitan Army to capitulate without striking a blow. Her shipping had been destroyed. She had entered the war with over five and a half million tons, later much augmented by capture and new construction, but her convoy system and escorts were inadequate and ill organized. Over eight and a half million tons of shipping were sunk, of which five million fell to submarines. We, an island Power, equally dependent on the sea, can read the lesson and understand our own fate had we failed to master the U-boats.

...

Next day, July 24, after our plenary meeting, had ended and we all got up from the round table and stood about in twos and threes before dispersing, I saw the President go up to Stalin, and the two conversed alone with only their interpreters. I was perhaps five yards away, and I watched with the closest attention the momentous talk. I knew what the President was going to do. What was vital to measure was its effect on Stalin. I can see it all as if it were yesterday. He seemed to be delighted. A new bomb! Of extraordinary power! Probably decisive on the whole Japanese war! What a bit of luck! This was my impression at the moment, and I was sure that he had no idea of the significance of what he was being told. Evidently in his intense toils and stresses the atomic bomb had played no part. If he had had the slightest idea of the revolution in world affairs which was in progress his reactions would have been obvious. Nothing would have been easier than for him to say, "Thank you so much for telling me about your new bomb. I of course have no technical knowledge. May I send my expert in these nuclear sciences to see your expert tomorrow morning?" But his face remained gay and genial and the talk between these two potentates soon came to an end. As we were waiting for our cars I found myself near Truman. "How did it go?" I asked. "He never asked a question," he replied. I was certain therefore that at that date Stalin had no special knowledge of the vast process of research upon which the United States and Britain had been engaged for so long, and of the production for which the United States had spent over four hundred million pounds in an heroic gamble.

This was the end of the story so far as the Potsdam Conference was concerned. No further reference to the matter was made by or to the Soviet delegation.

4. Bernard M. Baruch, *Baruch: The Public Years*, Vol. II of *My Own Story*, New York: Holt, Rinehart and Winston, 1960, pp. 358-382.

When Truman assumed the Presidency, the war was coming to its crashing climax. Three weeks after he took over, the "thousand-year-Reich" unconditionally surrendered. Four months later, as we braced for the final, dreaded assault on Japan, she was brought to her knees—suddenly, dramatically—by two mighty blasts that awesomely punctuated the end of the most violent war in history.

2

I have never forgotten the sense of awe I felt when I learned the meaning and implication of those gigantic and terrifying clouds which spread in evil splendor over Hiroshima and Nagasaki. I am still overwhelmed by the thought of this power which men have torn from nature—a power which can make the deserts bloom or incinerate the globe.

When I learned some of the facts about the atomic bomb, I realized that I had been given two earlier intimations of nuclear energy development, though I had not recognized them as such at the time. As far back as 1932, Charles MacDowell, a former WIB colleague, had told me of the work German scientists were doing to harness atomic energy. He thought of it not in military terms, but as a development which offered tremendous industrial possibilities. I never learned what came of his efforts to explore the matter. I have often shuddered, though, at what would have been the fate of the world had the Germans succeeded in harnessing nuclear power before we did.

The second hint came during World War Two, when Mrs. Roosevelt asked me to see a young scientist who had come to her with a matter she felt was of the utmost urgency. The young man was in a highly nervous state. All I could get from him was that he was engaged in developing a secret process at the University of Chicago, and that he was convinced his work was being obstructed. I could learn no more, but I had heard enough to know that this matter was not in my bailiwick. I asked Dr. Conant to see the troubled physicist. Later, I realized that the young scientist had been involved in the breakthrough experiments on nuclear chain reactions, which were carried on at the University.

From the moment we stepped into the atomic age, it was clear that America could not long retain a monopoly on nuclear energy. It was equally clear that the problems presented by its discovery, as Secretary of State Byrnes said before the United Nations General Assembly in January, 1946, could not be solved by any one nation. "They are the common responsibility of all nations." The control of this cosmic force demanded international coöperation of a character never before achieved in world society. I did not then imagine, as I followed the early discussions on this subject, that I would be called upon to help solve this most crucial problem of our age.

The first step toward the formulation of a plan to control atomic energy was taken in January, 1946, when Byrnes appointed a committee to investigate the problems involved. This committee consisted of Undersecretary of State Acheson, Dr. Conant, Dr. Vannevar Bush, former Assistant Secretary of War John McCloy, and Major General Leslie Groves, who had headed the Manhattan District—the code name for the A-bomb project—to study the problem of atomic control. The committee was assisted by a board of consultants headed by David Lilienthal, then Chairman of T.V.A.

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Then, early in March, Byrnes told me that President Truman wished me to serve as the American Representative on the United Nations Atomic Energy Commission, created by resolution of the United Nations to draft the American proposals for a system of international control. He stressed the importance of this task, and urged me to accept.

My first reaction was to decline. For more than five years I had been working, virtually on a full-time basis, in the war production program. I was looking forward to a rest. I also felt that the task Byrnes was offering me required a younger man; I was then in my seventy-sixth year. I went down to Hobcaw to think things over. But I soon realized that I could not decline. I sent word to Byrnes and returned North immediately to confer with him and other officials, and to begin studying the issues with which I would be dealing. But then, the situation was suddenly confused by the unauthorized publication of the report of the Acheson-Lilienthal group.

This report, which laid the basis for a system of international control of atomic energy, proved indispensable in formulating specific plans. But it was, in Acheson's words, a "rough sketch," "a sort of working paper." The report defined itself as "a place to begin, a foundation on which to build." It did not pretend to offer a definitive program; for example, it did not deal with the problem of enforcement—a problem which I considered crucial.

Nonetheless, the report was immediately interpreted as the official statement of American policy. And when, a day or two after its release, Sir Alexander Cadogan told me that he had been informed by Acheson that the United States would offer the Acheson-Lilienthal report to the United Nations Atomic Energy Commission as a basis for discussion, I immediately went to Acheson for clarification.

I could not understand why Cadogan, the British representative on the UNAEC, should have been informed of the United States's intention, about which I, the American Representative, was kept ignorant. Nor could I see the purpose of my appointment if the United States plans on atomic control had already been decided upon. When Acheson confirmed what Cadogan had told me, I told him plainly that he would then have to find another messenger boy, because Western Union didn't take anybody at my age. I had never served as a messenger or mouthpiece before, and did not intend to start now.

I asked for an appointment with President Truman. When I saw the President, I handed, him the following letter:

March 26, 1946

My dear Mr. President:

I was, of course, very much-gratified that you should have expressed such great confidence in me as to appoint me the United States representative on the United Nations Atomic Energy Commission. I do not underestimate either the honor or the responsibility but, as I have become more familiar with the situation, there are certain elements of it which are causing me concern, and which I, therefore, want to discuss with you. As I understand my duties and authority, they consist presently solely of the obligation of representing the United States policy on atomic energy, as communicated to me by you directly or through the Secretary of State, before the United Nations Organization. I see nowhere any duty or responsibility on me to participate in the formation of that policy.

This situation has been brought very forcibly to my attention by the press announcements of the report rendered by Mr. Acheson's Committee. I do not underestimate the effect of this publication in the United States or in the world at large, and while I have not had an opportunity to examine the report with care and cannot state my own definite views with respect to it, the letter from Secretary Byrnes to me transmitting the report states that it was unanimously recommend-

ed by a Committee headed by the Under Secretary of State. This brings the report pretty close to the category of the United States Government policy.

I have no doubt that the public feels that I am going to have an important relation to the determination of our atomic energy policy. There is no legal basis for this view and now that the Under Secretary of State's Committee Report has been published the determination of policy will be greatly affected by the contents of this report. Even the superficial and incomplete examination of the subject that I have been able to make in the last few days convinces me that this report is likely to be the subject of considerable and rather violent differences of opinion. Its publication, which I understand to have been unauthorized, does not render the situation any less difficult.

These are the things that have been bothering me, and I wanted to talk them over with you before coming to a final conclusion myself as to whether, in the circumstances, I can be useful to you. I will need a little more time to reflect. As it presently stands, I think that embarrassment all around would be avoided if you would ask Chairman Connally of the Foreign Relations Committee to postpone any action on confirmation of my appointment until I have had a little more time to think things over.

Respectfully yours,
Bernard M. Baruch

In discussing our interview in his memoirs, President Truman has suggested that I was trying to infringe on his Presidential prerogative to determine policy. He has written that he read me the powers of the Presidency, and admonished me that he and he alone would make policy. His recollection in this matter is, regrettably, inaccurate. Far from giving me any such lecture, Truman was most affable, and plainly anxious for me not to withdraw from the task. When the question arose about who was to draft the atomic proposals, he made this exact and characteristic reply: "Hell, you are!"

I understood this remark as an expression of his confidence in me, and his reliance upon me to give him my best advice as to what our policy should be. I appreciated, of course, that the final policy decision had to come from him—and, to his everlasting credit, the one President Truman made was sound.

Byrnes echoed the President's attitude. At a meeting with him attended also by John Hancock, Byrnes remarked, as Hancock noted in a memo summarizing this talk, that he "depended upon Baruch to take the initiative, develop the plans, and carry the initiative in the creation of a policy which . . . [Baruch] might have approved by the President as . . . [Baruch] might wish."

With my position clarified, and fortified further by this expression of the President's and Byrnes's confidence, I assembled my team of alternates and fellow workers. I turned once again to John Hancock and Herbert Swope. I also called on Ferd Eberstadt and Fred Searls, head of Newmont Mining Corporation and a former assistant to Byrnes in OWM. These men put aside their private interests to serve with me. Without them, I could not have carried on the work.

By and large, public reaction to the appointment of me and my colleagues was gratifying. But, of course, approval was not unanimous. In scientific circles particularly, there was disappointment and dissatisfaction at my selection. I had hoped that the State Department board of scientific consultants would continue to serve in that capacity as advisers to me; and I asked Byrnes to request them to do so. They declined for a variety of reasons. There were also the usual aspersions on "Wall Streeters," and one or two men displayed some pique, apparently because they felt they should have been given the job.

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Beyond these personal reactions, however, there appeared to be a sincere conviction among scientists that only a scientist could cope with the problem of controlling the atom. Vannevar Bush, a distinguished scientist, and also my friend, was a man who never let friendship keep him from speaking his mind. He told me pointblank that, in his opinion, I was the most unqualified man in the country for the task.

'Doc, you couldn't be more right," I said. "Put on your hat and let's go tell the President, and that will let me out."

"If you get out," Bush protested, "the damn thing will blow up."

"If I stay in, I'm unqualified, and if I get out, it will blow up," I said. "What do you want me to do?"

"Oh, hell," Bush exploded, "stay in."

I could understand the concern of the scientists, and I tried not to be offended by their initial patronizing attitude. I was well aware of my ignorance about nuclear science. But I could not agree with Niels Bohr, who said to me, "Why not leave the question of atomic control to the scientists? They wouldn't destroy the world."

Quite apart from the implication in Bohr's remark that scientists were wiser or more noble than others when it came to dealing with the world's fate, I rejected his assumption that the fundamental problem in the control of nuclear energy is scientific. Albert Einstein once declared that the control of nuclear energy is an ethical and political problem. This was exactly my view. The problem, as I have said, is "a problem of the heart of men." At its root lies the question of man's willingness to stop killing his fellow man, to forge a society in which force is not the arbiter of disputes. To control the atom, men must learn to control the brute which lives in man.

Once I got to work, however, I found scientists who were willing to help. R. F. Bacher, Arthur H. Compton, C. A. Thomas, and Harold Urey rendered invaluable aid to me by serving on the Scientific Panel. So did J. Robert Oppenheimer, who had played so vital a role in the development of the atomic bomb. His is one of the most brilliant minds I have ever encountered. I remember a two-hour lecture he gave at my request to acquaint other representatives of the Atomic Energy Commission with the ABC's of atomic energy. For sheer intellectual virtuosity, it was a performance that could hardly be surpassed.

General Groves and General Thomas F. Farrell also gave important assistance. But the scientist on whom I relied most was the late Dr. Richard C. Tolman, of the California Institute of Technology, whose services I enlisted with Conant's help. I never knew a wiser man.

Both Acheson and Lilienthal were also very helpful and cöoperative. Lilienthal, although reluctant at first to continue working on the atomic energy problem, later offered to do anything he could to help. I struck up a warm friendship with this man, who ultimately became the first chairman of the United States Atomic Energy Commission.

Before he was confirmed for this post, Lilienthal was subjected to violent attack, with Senator Kenneth McKellar acting as his chief tormenter. Lilienthal came to me in a despondent mood, regretting that he had ever entered public service. I tried to encourage him, and told him that he was permitting his critics to take the initiative. They, rather than he, were defining his views. I suggested that he seize the first opportunity to state his own convictions, which was the same kind of advice I had tried to give Mr. Wilson on the ship coming home from Paris. It was advice I myself have always tried to follow—never to let my critics say what is in my own mind. Lilienthal took it. Next day, he appeared before the Senate committee holding hearings on his nomination, and delivered that memorable statement of his philosophic faith which stirred the nation and subdued his enemies.

3

With the aid of all these men, and with the Acheson-Lilienthal report as a guide, we set to work to elaborate a plan for the international control of atomic energy. Most of the next two months were spent in study and in conference with scientists, technical experts, State Department aides, military advisers, specialists of every kind. The most complex questions had to be answered, and a staggering variety of information obtained.

There was no question on the basic principle of international control. How to effect it was the problem—how, for the first time, to provide international jurisdiction which would be effective. Where, for example, should such jurisdiction begin? With the ownership of mines containing fissionable ore, or at the point where fissionable materials were refined from the ores? What means could be devised to detect violations? And how could we provide an effective system of inspection without encouraging espionage or infringing upon the legitimate privacy of nations? How could we propose a scheme which would provide ultimate effective control, without jeopardizing the American national interest until that control was achieved? Should the plan be limited to atomic weapons, or include biological and chemical weapons of mass destruction as well? And what form should the agreement take—a UN resolution or a conventional treaty?

These were some of the questions confronting us. But central to all of them was the question of enforcement, of preventing any agreement on control of atomic energy from becoming another in the long line of history's empty declarations and gestures. The lesson of the League and the fight over Article X of the Covenant—the record of meaningless disarmament agreements and renunciations of war—were very much in my mind. If I had learned anything out of my experiences in international affairs, it was that world peace is impossible without the force to sustain it. Consequently, I insisted that any plan for the control of atomic energy contain provision for sanctions against those who violated the rules.

Many people, among them Dean Acheson, had little faith in the efficacy of sanctions. Violations would have to be dealt with through juridical processes, Acheson said, which seemed to me to beg the question. Acheson felt that we could do no better than to rely upon an inspection system to detect violations and warn us against any potential atomic attack. An effective system of inspection could, it was estimated, provide us with a twelve months' warning period at best; more likely it would be only three months. (Today we measure it in minutes.)

But I insisted that a warning system was not enough; if peace were to be more than an interlude between wars, we would have to invoke penalties against would-be aggressors.

The question of sanctions brought us up against the issue of the veto in the Security Council. Any member, by exercising its veto, could prevent the UN from acting against violation of the atomic agreement. Consequently, we proposed that once the atomic control agreement was ratified, the veto power could not be exercised against the application of penalties invoked under it.

Day after day we wrestled with these and other issues. Finally, on June 7th, we completed a "Statement of United States Policy." I took this document to Secretary Byrnes, who approved it, and then the two of us went over to the White House to submit it to President Truman. I asked him to read it in my presence, so that I could answer any questions he might have. President Truman read the statement of policy. As he read, he initialed each paragraph, and at the end he wrote out his formal approval and signed his name. He did not change a word.

We discussed the crucial questions of sanctions and the veto. I pointed out that in the last analysis the only penalty we could invoke against a nation found guilty of transgression was

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war. Mr. Truman was absolutely firm on this. "I quite agree with you," he said. He went on to declare that if the world had followed Henry Stimson in his call for sanctions against Japan at the time she invaded Manchuria, the Second World War might never have occurred.

I was tremendously impressed with President Truman on this occasion. His grasp of the subject was sure. He displayed an understanding of the plan, and a determination to make it work.

I want to underscore that no man ever received more encouragement and support from his chief than I did from President Truman during my service on the Atomic Energy Commission. I say this as one who has had serious disagreement with him on other matters, and as one whose personal relationship with him has been ruptured.

When we left the meeting, the President returned the approved "Statement of United States Policy" to me with a memo saying that it was for my guidance as the Representative of the United States on the Atomic Energy Commission of the United Nations. The memo went on:

> . . . want you to have authority to exercise your judgment as to the method by which the stated objectives can be accomplished.
>
> If as negotiations progress you conclude that there should be changes in this statement of policy, I will expect you to advise me and to frankly give me your views.
>
> I know that you will keep me advised as to the negotiations. However, I want you to know that I am relying upon you to exercise your own discretion in those negotiations, subject only to the general statement of policy attached, unless you should receive through the Secretary of State a further statement of policy.

A few days after delivering the policy statement to the President, Swope, Eberstadt, and I were sitting on a park bench discussing the address I was to give before the UNAEC in presenting the American plan for control of atomic energy. I said I wanted to convey, in my opening remarks, my conviction that the question the delegates were about to debate was a matter of life and death for the world.

A day or so later, Swope called me on the phone and said, "I've got your opening line. It comes from the best possible source—the Bible." Thus it was that on June 14th, I rose before the assembled members of the United Nations Atomic Energy Commission and said:

> We are here to make a choice between the quick and the dead.
>
> That is our business.
>
> Behind the black portent of the new atomic age lies a hope which, seized upon with faith, can work our salvation. If we fail, then we have damned every man to be the slave of Fear. Let us not deceive ourselves: We must elect World Peace or World Destruction.
>
> Science has torn from nature a secret so vast in its potentialities that our minds cower from the terror it creates. Yet terror is not enough to inhibit the use of the atomic bomb. The terror created by weapons has never stopped man from employing them. For each new weapon a defense has been produced, in time. But now we face a condition in which adequate defense does not exist.
>
> Science, which gave us this dread power, shows that it *can* be made a giant help to humanity, but science does *not* show us how to prevent its baleful use. So we have been appointed to obviate that peril by finding a meeting of the minds and the hearts of our peoples. Only in the will of mankind lies the answer. . .
>
> In this crisis, we represent not only our governments but, in a larger way, we represent the peoples of the world. We must remember that the peoples do not belong to the governments but

that the governments belong to the peoples. We must answer their demands; we must answer the world's longing for peace and security. . . .

In our success lies the promise of a new life, freed from the heart-stopping fears that now beset the world. The beginning of victory for the great ideals for which millions have bled and died lies in building a workable plan. Now we approach fulfillment of the aspirations of mankind. At the end of the road lies the fairer, better, surer life we crave and mean to have. . . .

The peoples of these democracies gathered here have a particular concern with our answer, for their peoples hate war. They will have a heavy exaction to make of those who fail to provide an escape. They are not afraid of a internationalism that protects; they are unwilling to be fobbed off by mouthings about narrow sovereignty, which is today's phrase for yesterday's isolation.

The basis of a sound foreign policy, in this new age, for all the nations here gathered, is that anything that happens, no matter where or how, which menaces the peace of the world, or the economic stability, concerns each and all of us.

I went on, then, to outline the American plan for the control of atomic energy. It called for the creation of an International Atomic Development Authority "to which should be entrusted all phases of the development and use of atomic energy starting with the raw materials and including—

1. Managerial control or ownership of all atomic-energy activities potentially dangerous to world security.
2. Power to control, inspect, and license all other atomic activities.
3. The duty of fostering the beneficial uses of atomic energy.
4. Research and development responsibilities of an affirmative character intended to put the Authority in the forefront of atomic knowledge and thus to enable it to comprehend, and therefore to detect, misuse of atomic energy."

The Authority was to have the right of free access at all times for inspection; and, by a system of rapid and effective punishment, it was to provide "a program not composed merely of pious thoughts but of enforceable sanctions—an international law with teeth in it."

". . . The matter of punishment lies at the very heart of our present security system," I said. Any nation guilty of illegal possession or use of atomic bombs, or of illegal possession of materials suitable for use in bombs, or of seizure of Authority plant or property, or any other violation, would be liable to "immediate, swift and sure punishment. . . ." "Penalization is essential. . . ." "There must be no veto to protect those who violate their solemn agreements not to develop or use atomic energy for destructive purposes."

After a system of effective controls was brought into operation by successive stages, the United States would cease the production of bombs, and dispose of its existing stockpile of bombs according to the terms of the agreement.

I concluded my presentation of the American plan with this statement:

In the elimination of war lies our solution, for only then will nations cease to compete with one another in the production and use of dread "secret" weapons which are evaluated solely by their capacity to kill. This devilish program takes us back not merely to the Dark Ages but from cosmos to chaos. If we succeed in finding a suitable way to control atomic weapons, it is reasonable to hope that we may also preclude the use of other weapons adaptable to mass destruction. When a man learns to say "A" he can, if he chooses, learn the rest of the alphabet too.

Let this be anchored in our minds:

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> Peace is never long preserved by weight of metal or by an armament race. Peace can be made tranquil and secure only by understanding and agreement fortified by sanctions. We must embrace international cooperation or international disintegration.
>
> Science has taught us how to put the atom to work. But to make it work for good instead of for evil lies in the domain dealing with the principles of human duty. We are now facing a problem more of ethics than of physics.
>
> The solution will require apparent sacrifice in pride and in position, but better pain as the price of peace than death as the price of war.

This, then, was our proposal for the control of atomic energy, of which General Eisenhower was to say: "In truth, it demands nothing of others which the United States is not willing to give to others." It was a proposal unprecedented in its generosity. The United States offered to surrender a weapon it alone possessed, and to share its secrets, on only one condition—that every nation be guarded against its destructive use.

4

In the following weeks, the details of the American plan were spelled out to the UNAEC. The reaction to our proposals was overwhelmingly favorable among the United Nations, except, of course, for the Communist bloc. In the United States, public opinion upheld the plan by a large majority. But there was criticism in some quarters that the plan was too generous, that we were giving away too much. And a few, of whom Walter Lippmann was representative, criticized our proposal dealing with the veto. They failed to understand that in this lay the very heart of the American position.

A few days after the presentation of the American plan, Andrei Gromyko presented the Russian proposals, which were elaborated in a series of closed meetings during the last week of July and the first week of August. In brief, the Soviet plan called merely for an international convention outlawing the production and use of atomic weapons, and requiring the destruction of all atomic weapon stockpiles. The Russians were adamantly against any system of international inspection, control, and punishment; they refused even to consider surrender of the veto, protesting that this did violence to national sovereignty.

Of course it did! Every treaty involves some diminution of sovereignty. For myself, I believed it was time to start freeing ourselves from the fetish of national sovereignty. Just as the doctrine of unbridled laissez faire is no longer applicable to twentieth-century America and the world, so the extreme dogma of national sovereignty is no longer applicable in an age when the lives and destinies of nations are inextricably bound together. Naturally, the international control of atomic energy involves the surrender of some portion of sovereignty to a higher sovereignty—to an instrument of world order.

I summed up the differences between the American and Soviet positions in a letter to Mr. Truman on July 2nd:

> The Russian-Polish position boils down to this—that they would like to agree not to use atomic weapons, to cease their production, and to destroy our stockpile of bombs in advance of adequate measures of control and safeguards. If and when we have done this, they are ready to discuss arrangements for exchange of scientific information and the formation of international controls, inspection, licensing, surveys and general overall look-see.
>
> Our position, as you know, is that we want to start at the bottom of all atomic energy—the raw materials out of which fissionable materials can be made. These must be controlled or owned or a grip gotten upon them by every device of human ingenuity before atomic energy, the

product of these raw materials, gets started on its way. We must be sure it will move into peace and not into war.

If we accept the Russian position, the atomic race would really then be on, because there would be nothing but the so-called good faith of nations' pious wishes and no enforcement or knowledge of what anyone else was doing.

I think we should stand firm on the position we have taken, in order that, through no compromise, will false hopes be raised among peaceful peoples, leaving any malevolent nation or nations in a position to destroy the peaceful nations. I am sure you concur in this.

President Truman was in complete accord with me. He replied on July 10th:

. . . It is my opinion that we should stand pat on our program. . . . We must have assurance that the raw materials from which atomic energy can be released are controlled at the source and I am of the opinion that we should not under any circumstances throw away our gun until we are sure the rest of the world can't arm against us.

After the American and Soviet plans had been presented, the detailed negotiations began. I and my associates were, at the outset, hopeful that an agreement would be reached, within a few months, if the Russians were acting in good faith. John Hancock, always cautious, estimated that it would take a year. John Foster Dulles, whose counsel we sought, thought the chances of agreement were good if only because the Russians would not want to isolate themselves from the rest of the world, and would therefore go along with world public opinion.

Our optimism proved unwarranted. From all the subsequent alarums and excursions, the diplomatic maneuvers, the envenomed tirades of Andrei Vishinsky, the, stolid debating of Gromyko—from all these, one central fact emerged: The Russians would not countenance an effective system of international control of nuclear energy.

The Russians could not argue that the American proposals were unworkable, or that they did not provide the protection to which all nations were entitled. A Scientific and Technical Committee of the Atomic Energy Commission, on which the Russians were represented, had already agreed unanimously that effective control was scientifically feasible. Yet the Russians would not yield, nor would we surrender our basic principle.

By mid-September, after three months of intense debate and discussion, it was clear that deliberations were deadlocked. On September 17th, I prepared another lengthy report to President Truman on the American and Russian positions. "We see no possibility of reconciling these views," I wrote. "Agreement could be effected only through a drastic change in the Soviet position or through a sacrifice by us of the very principles which were unanimously endorsed by the United Nations last January and restated your instructions to me. Abandonment of those principles would mean defrauding the peoples of the world."

I went to Washington to present my report to the President and to discuss the situation with him. It was at this point that a storm broke over the American proposals-not from the direction of the Russian Politburo, but from the President's own Cabinet.

In a move that was as ill-timed as it was ill-considered, Secretary Wallace called for the United States to scrap its atomic proposals. A week earlier, Wallace had attacked American policy toward Russia in an address at Madison Square Garden. The resulting furor was compounded by uncertainty over whether or not Truman had endorsed the speech. Now, on September 17th, the same day that I prepared my report, Wallace released a letter, written some weeks earlier to President Truman, in which he elaborated his criticism of our Russian policy.

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Much of this letter was taken up with an attack on our atomic energy plan. He characterized it as "one-sided," "not workable," "self-righteous," "take it or leave it"-one which the Russians could not accept. Attacking the step-by-step principle, Wallace called for a single package under which we would destroy all our bombs and surrender all our secret information without any guarantees of protection.

Wallace's letter was a bombshell. Byrnes was then attending a Foreign Ministers Conference in Paris, trying to negotiate peace settlements; I was trying to conduct equally difficult negotiations in the United Nations. Wallace's letter threatened to torpedo both these efforts. When an important Cabinet officer speaks out, as Wallace had done, in direct conflict with established policy, world opinion is bound to be confused.

On the morning of September 18th, I went to the White House in company with Hancock and Assistant Secretary of State Clayton. I had intended to report on the state of the negotiations at the UN, but I told the President that this could wait; it was more important to discuss the Wallace matter. The President was pleasant but grim, and expressed himself pungently on the disclosure of the Wallace letter. Hancock, as was his custom, dictated a memorandum of the meeting immediately after it adjourned. I quote from Hancock's memo:

> He [Baruch] told the President in a very firm but very friendly manner that so far as he could see there were three choices open to us. First, a full retraction on the part of Mr. Wallace; second, an utter repudiation of Mr. Wallace's statements; or third, that we resign, as our usefulness was ended. The President told us of his plan to see Wallace, asked us not to be in a hurry about resigning, and told us that he thought his action in the afternoon would be satisfactory to us. Mr. Baruch used some such words as these—that our position was in no way an ultimatum but that we still saw only those three courses open.

President Truman saw Wallace that afternoon. The President was, no doubt, in something of a dilemma. He was anxious to retain Wallace in the Cabinet because the Secretary had a political following and elections were coming up. On the other hand, he could not keep him at the high cost to national unity and international confidence which was threatened. What President Truman said to Wallace that afternoon I do not know; but as a result of it, Wallace pledged to remain silent until the Foreign Ministers Conference was ended, in about a month.

But meanwhile, Byrnes communicated with the President from Paris advising that Wallace would have to go or that he too would resign. That did it. On the 20th, Truman asked for and received Wallace's resignation.

I have always maintained that every man has a right to be wrong in his opinions. But no man has a right to be wrong in his facts. Wallace was wrong in his facts. He was wrong in asserting that under our proposals the United States alone would determine the timing of the transition and the sequence of steps to be taken in developing atomic controls. He was wrong in his assertion that the Soviet plan went further than the American proposal in providing safeguards against violation. And he was wrong in asserting that the United States refused to modify its plan. We were ready to strengthen our proposals and to negotiate any details which did not violate the basic principle of our mandate.

Wallace's attack, launched from his privileged position in the Cabinet, created public uncertainty and divisiveness where unity was essential. In the hope that some of the harm could be undone, I telephoned Wallace and invited him to meet with me. Wallace stalled for several days, but after several phone calls and telegrams, he finally came to New York with his aide, Philip Hauser. With Swope, Hancock, and Eberstadt present, I went over Wallace's position

point by point, showing him where he had been misinformed. I quote again from the notes Hancock made immediately following the meeting: "As Mr. Wallace was about to leave, he summed up his view of the discussion by stating: 'It is obvious that I was . not fully posted.'"

Before leaving, Wallace expressed his regret that he had not consulted with me earlier. He agreed to make a public statement correcting his misunderstanding and expressing his endorsement of the policy approved by the President. Hauser and Swope prepared the statement; but after it was drawn, Wallace reneged. Thereafter, he carried on an increasingly militant attack against American foreign policy. His views were overwhelmingly rejected when he sought the Presidency in 1948.

5

Wallace was not the only one anxious to conciliate the Russians. I, myself, tried in every way during the negotiations in the AEC to ease Russian suspicions and convince them of America's good faith. I understood and sympathized with the Russian obsession with security, ravaged as their country had been in the war.

In the face of Soviet intransigeance, some of my colleagues had urged me to denounce the Russians, to force an early vote and make the break. But I refused. I kept insisting that we must make every conceivable effort to reach an agreement. I told Eberstadt and Swope one day, after a long session, "I don't care what they call me or what they think of me. They may think I'm a senile old fool, but I'm not going to give the Russians or anyone else the chance to say that we did not explore every possible avenue in the search for agreement." For a while, we even entertained the thought of going to Moscow to appeal to Stalin personally. George Kennan, the Russian specialist, another of the experts whose views we constantly sought, thought it might be a good idea.

During those months of debate, I came to appreciate how well Soviet diplomats serve their government. I could not help but admire Gromyko's ability. I came to know him rather well, spending many hours in private, informal talks with him, both then and since. In private I found him always pleasant, even when he was most obdurate.

Once I asked Gromyko why it was that the American plan was not published in full in the Soviet press. Didn't this mean, I inquired, that the Soviets were unwilling for their people to know exactly what we proposed? "Oh, no," Gromyko answered, "it's because of a shortage of newsprint." But when I offered to provide all that was needed if Gromyko would promise full publication, he was silent.

My years and my amateur status as a diplomat gave me the prerogative of speaking in a very undiplomatic style. I used to tell Gromyko, "Can't you see it's to your interest as well as ours agree to this plan? Someday the Russian people are going to hold your government responsible if we fail to control the atom."

For all his dour looks, Gromyko is not without a sense of humor. I took him to the second Joe Louis-Billy Conn fight, and when the champion, making up for his poor showing in the first encounter, was pounding poor Conn from pillar to post, Gromyko leaned over and remarked, "Conn must wish he had the veto."

After six months of debate on the control of atomic energy, I was ready to concede that further debate was hopeless. My associates had been pressing me to call for a vote, and at last I agreed. The vote was scheduled for December 30th. Just before I entered the committee chamber, Sir Alexander Cadogan called me aside, and told me that His Majesty's Government could not support the American position.

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To say the least, I was shocked. The British had stood firmly with the United States from the very beginning. I could not understand this reversal, unless they were trying to bluff us into putting off a vote. As I heard Sir Alexander's words, however, I could feel the color leave my face. I told him in the plainest language, and in the presence of others, that if Britain walked out on us, I would denounce her in unmeasured terms.

Cadogan, who was only following his instructions, took it all with perfect diplomatic aplomb. We then went in to take the vote. The bluff having failed, Britain voted with the United States and eight other nations in support of the American plan. Poland and Russia abstained.

With the issue now before the United Nations Security Council, I felt that my work was over, and on January 4, 1947, I submitted my resignation to the President. Mr. Truman replied:

> Dear Mr. Baruch:
>
> The Secretary of State has handed me your letter of resignation as the Representative of the United States on the Atomic Energy Commission.
>
> At first I was reluctant to accept the resignation. However, upon reflection, I have to agree with the correctness of the conclusions stated in your letter. The recent action of the General Assembly of the United Nations placed the responsibility for the consideration of disarmament proposals primarily upon the Security Council, where Senator Austin will represent the United States. I am impressed by the fact that, with one exception, the governments represented on the Security Council have the same representatives on the Atomic Energy Commission.
>
> I know how tremendously interested you have been in the accomplishment of the task assigned you, and when you tell me that you believe your task is completed and that the work should now be taken over by Senator Austin, I accept your decision.
>
> I wish to congratulate you most heartily on having secured the acceptance by the Commission of the United States proposal. It is inevitable that members of the Commission representing many governments should have differences of opinion as to the best approach to a solution of this problem. That our proposal should finally be accepted by a vote of ten to nothing, with two states abstaining, is a tribute to the fairness of our proposal. At the same time, it is convincing evidence of your skill and patience in presenting the proposal.
>
> I wish you would extend to those who have been associated with you in this most important service my sincere appreciation of their efforts. Your own efforts in this matter only furnish additional evidence of your unselfish devotion to your country.
>
> Very sincerely yours,
> Harry S. Truman

In the almost fifteen years which have elapsed, since the United States offered its plan for the control of nuclear energy, the deadlock with the Soviet Union has persisted. And yet, the need for effective control has grown more urgent with each passing year. Today the United States and the Soviet Union each have nuclear arsenals capable of destroying the world. Nor is the nuclear club as exclusive as it once was; almost any nation can make atomic bombs today. We must face the fact that the scientific know-how of developing nuclear energy is no longer secret. Within the foreseeable future, many nations, especially those who aspire to first rank, will have armed themselves with nuclear weapons. France's insistence on developing such weapons is a case in point.

What, then, will be the danger of nuclear war when many countries are armed with the H-bomb? Not long ago, the world was thrown into a sudden panic by the erroneous story that Argentina was making atomic bombs. No one imagined that our southern neighbor was embarked on a course of world conquest. Still, no thoughtful statesman or citizen could avoid a

chill of fear when he visualized what ultimate catastrophe might result if some mad, power-hungry dictator, even in a small nation, should become inflamed with dreams of glory, or if two small countries owning the bomb should become embroiled in a war.

I often tried to drive this point home with Gromyko, and I never miss a chance to impress it whenever I talk to the Russians now. The fact is that the atomic bomb makes all nations equal, just as the Smith & Wesson revolver made all men equal on the old frontier. When the Russians begin to understand this, they may show themselves more amenable to accepting a workable plan for atomic control.

Many people claim it is no longer possible to devise a system of international control. They argue that, in the past decade, stockpiles of bombs and fissionable materials have been created and techniques developed which are impossible to detect. I reject this contention. It is one of despair and defeat. I am certain that it is still scientifically and technologically feasible to devise an effective system of control. We must not settle for less. In this case, it is not better to accept half a loaf. To do so would be to lull the world into a false sense of security, jeopardizing our own survival.

The control of atomic energy remains one of the crucial elements in the making of a durable peace. As long as the threat of atomic destruction hangs over the world, there can be no peace; but if we can abolish nuclear weapons by a system of effective, and enforceable controls, we will have taken a long step toward the abolition of war itself.

In the atom we have a power for tremendous good as well as evil. The uses of nuclear energy—in science, medicine, industry, agriculture, transportation—are limitless. If we could but devote the atom to peace, we would have a tremendous weapon to use in the only war worth fighting-the war against hunger, poverty, and disease.

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5. James F. Byrnes, *Speaking Frankly*, N.Y.: Harper & Brothers, 1947, 257-276.
Chapter 13, Control of Atomic Energy

I DO NOT REMEMBER just when it was that President Roosevelt told me about the atomic bomb. I do remember that it was a hot summer afternoon and the two of us were sitting alone in his oval office discussing certain phases of the war mobilization program. Suddenly, and for no apparent reason, he began to tell me the awesome story of the Manhattan Project.

I confess I thought the story fantastic. I was sure the President was exaggerating the possibilities just to watch my amazed reaction. I didn't disappoint him. And, as he noted my amazement, he proceeded with obvious pleasure to astound me with the scientists' prediction of what atomic energy would do. He told me that, prior to 1939, the Germans had made some progress with their experiments and he knew they were continuing their efforts. It was a race between us, he said, to see who could develop the first bomb.

At that time, which I believe was the summer of 1943, the President thought the Germans were ahead of us in the atomic race. It was evident that the information on which he based his belief contained more speculation than fact. Our Intelligence agents necessarily were restricted in securing accurate information on such a highly technical matter. From what we learned after the war, it was clear that the President had overestimated the progress of the Germans in this respect. Nevertheless, such reports served to stimulate the extraordinary efforts put forth on the Manhattan Project.

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After the first discussion, neither the President nor I mentioned the atomic project to each other for many months. In fact, no one ever talked about it unless it was absolutely necessary. I remember once mentioning it to Secretary of War Stimson who, from its very inception, personally supervised the Manhattan Project. His reaction indicated surprise that I knew about it.

Even if the President had not told me about the project, as Director of War Mobilization I could not have avoided noting certain aspects of an enterprise as colossal as this. It, of course, held a top priority both for men and materiel. With manpower one of our most critical shortages, a project that at its peak claimed the labor of 125,000 men could not escape my notice, particularly since so many of the workers were highly skilled technicians.

However, I was not directly concerned with the project and was too busy to be curious. Thus it was not until December 1944, when another aspect of the labor situation brought me into the picture, that I learned definitely of the great progress we had been making.

An effort was being made to organize the workers at the Oak Ridge plant; controversies over the jurisdiction of the labor organizations involved had arisen and these had been referred to the National Labor Relations Board. The public hearing required under the circumstances had been postponed four times at the War Department's request; no further postponement was possible.

Under Secretary of War Robert Patterson and Major General Leslie R. Groves came over to the White House to discuss the problem with me. General Groves pointed out that the hearing would require the presentation of evidence on such things as the number of workers employed, the number to be employed, the relationship of a particular unit to the project as a whole, and so on. Such evidence, General Groves was convinced, would necessitate disclosures that would seriously jeopardize the security of the project. They thought it would be helpful if I would arrange a meeting at . the White House for the three of us and the leaders of the labor organizations involved. I agreed.

During our discussions Mr. Patterson said that the War Department would know by April 1, 1945, whether or not they could develop the bomb. Both he and General Groves thought the effort would succeed, and they were confident they would know one way or the other by that date. It was the first time I had heard anyone venture to name a date.

The conference was arranged for the morning of December 5. The union officials were Mr. Joseph P. Clark of the International Brotherhood of Firemen and Oilers and Mr. Al Wegener of the International Brotherhood of Electrical Workers.

We took these men into our confidence. We told them that few people knew about the project. At that time, I believe, only four members of Congress had been given any concrete information. We asked the labor officials to waive their rights under the Wagner Act and to cooperate with General Groves in protecting the security of the project. They were good and patriotic men. They agreed to help and left immediately to do so. They were given authority to explain the situation to the presidents of their respective unions, Mr. John F. McNamara and Mr. Edward J. Brown; both of these leaders likewise promised their full co-operation. Their promise involved sacrificing rights given them by the law, but they kept it. They convinced the local union leaders, and the secret was protected for the duration of the war.

As a matter of fact, it was always amazing to me that the project did not become more generally known. It also was surprising that the Congress was willing to appropriate approximately two billion dollars without demanding more information on the use to which it was being put. It is a great tribute to those few congressional leaders who did have some idea of the nature of the project that they resisted the temptation to tell their colleagues and thus share the great responsibility.

The April 1 deadline came, but the result of the gigantic effort still was in doubt. Secretary Stimson, however, was confident of success. He instilled his confidence in the President. I am glad he did. But I have always regretted that President Roosevelt died without knowing definitely that the project was a success: It had been undertaken and carried to a conclusion solely because of his vision and courage in the days when the effort seemed hopeless.

Shortly after President Roosevelt's death, Secretary Stimson told President Truman that the scientists and others who had been working under his direction felt confident they would produce an atomic bomb within a very short time. He suggested the appointment of an Interim Committee to consider and make recommendations to the President on such important questions of policy as the test of the bomb, its use in the war, and the postwar use of atomic energy.

President Truman approved Mr. Stimson's suggestion and asked him to serve as chairman. The President requested me to act as his representative on the committee. The committee also included Under Secretary of the Navy Ralph Bard; Assistant Secretary of State William L. Clayton; Dr. Vannevar Bush, Director of the Office of Scientific Research and Development; Dr. James B. Conant, President of Harvard University; Dr. Karl T. Compton, President of the Massachusetts Institute of Technology; and Mr. George L. Harrison, president of the New York Life Insurance Company and special consultant to Secretary Stimson. Mr. Harrison served as chairman in Secretary Stimson's absence. We were assisted in our work by a group of scientists who had been connected with the project. They were Dr. Arthur H. Compton, Dr. Enrico Fermi, Dr. E. O. Lawrence, and Dr. J. Robert Oppenheimer.

During May and June 1945, while the attention of the country was focused on the end of the European war and on the San Francisco Conference, this group worked quietly and intensively in Washington. It was an interesting—and exciting—task. Some of the newspaper correspondents noted my presence in Washington when I was supposed to be resting in South Carolina, and were curious about my activities. Of course, I couldn't tell them, so they resorted to speculation. Most of them speculated that I was there in connection with some appointment in the government service.

During that period I made several trips to the Naval Hospital at Bethesda, Maryland, to talk with former Secretary Hull and get the benefit of his advice about the work of the Department of State, which I was to take charge of in a few weeks. On one of these trips two young sailors showed me how unimportant was my war service.

They were hitchhiking, but were not making much progress. One, in fact, was leaning against a post, slightly intoxicated. I thought he needed a ride. They got in the front seat with me. The boy who sat next to me was very alert. I got the impression that he wished to divert my attention from his friend and, therefore, was doing a lot of talking. Finally he asked me what my business was. I told him I did not have a business; that I was out of a job. He sympathized with me and then asked what had I done. Thinking to impress him, I said I had been Director of War Mobilization. His expression clearly showed he had never heard of it. After being quiet for a second or two, he made another effort to satisfy his curiosity and asked: "Well, what did you do before that?"

"I was Economic Stabilizer," I said. I saw he had never heard of that one either.

"I mean before the war," he replied.

"I was a Justice of the Supreme Court," I told him. This time he was impressed, and asked: "You mean the High Court?"

"Yes," I said.

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He nudged the redheaded boy next to him: "How would you like to be a member of the Highest Court?"

The young sailor replied: "I wouldn't like it. No chance for promotion."

In the first meeting of the Interim Committee, Doctors Bush, Conant and Compton described the destructive power of the bomb. After hearing them, I was confident that, when developed, it would bring a speedy end to the war in the Pacific. I remembered that as a member of the Senate committee handling naval appropriations I had often heard naval officers say that a new defensive weapon was developed for every offensive weapon. I asked the scientists what defense there could be against the atomic bomb. But these distinguished gentlemen, who had directed the advisory work on the bomb, could think of no defense. They did anticipate the development of still larger and more destructive bombs. I asked them if I should believe the only defense against further development was to kill off all the scientists. This suggestion did not appeal to them.

After listening to the scientists discuss the development of the project, we spent a day with the industrialists and engineers who had performed the amazing task of constructing the huge plants in Tennessee and Washington, and of installing the manufacturing processes that produced the bomb. Because it was a vital point in any decision on a system of control, I asked both groups how long it might take other governments to produce atomic bombs. The question, of course, was not only one of physics, but one of materials, of engineering skills, of technical know-how, and many other factors. From all the information we received, I concluded that any other government would need from seven to ten years, at least, to produce a bomb. And I think that to accomplish the task at such speed would require a quicker return to normal conditions than has taken place in any country within the last few years.

On July 1, 1945, the Interim Committee unanimously recommended to the President that the bomb be used against Japan as soon as possible. It added that the bomb should be used only where war plants or military installations were located. With the exception of Mr. Bard, the committee recommended that it be used without warning. This last question we had carefully considered.

We feared that, if the Japanese were told that the bomb would be used on a given locality, they might bring our boys who were prisoners of war to that area. Also, the experts had warned us that the static test which was to take place in New Mexico, even if successful, would not be conclusive proof that a bomb would explode when dropped from an airplane. If we were to warn the Japanese of the new highly destructive weapon in the hope of impressing them and if the bomb then failed to explode, certainly we would have given aid and comfort to the Japanese militarists. Thereafter, the Japanese people probably would not be impressed by any statement we might make in the hope of inducing them to surrender.

Arrangements for the test in New Mexico also were a problem for the committee. Because no one could be sure what the full results of the first atomic explosion might be, arrangements had to be made to evacuate the whole area if necessary. We knew that under the best circumstances the explosion would reverberate so far that secrecy would be difficult to maintain. News releases, with stories to meet every foreseeable contingency, were prepared and were to be issued to the public only if the circumstances required.

As the President's representative on the committee, it was my duty to report to him the reasons for our various recommendations. Throughout our deliberations, I told him, we relied on the estimates of the military situation presented by the Joint Chiefs of Staff. Their plans called for an invasion of Kyushu, the southernmost island of the Japanese homeland, on November 1. This was to be followed by an invasion of the main island of Honshu in the spring of 1946.

The Joint Chiefs anticipated that more than five million of our armed forces would be engaged. The Japanese armies were then estimated at about five million—an estimate we later found was quite accurate. Secretary Forrestal had told me that the Japanese air force suicide attacks were increasing our losses in ships and in human lives. These attacks gained in intensity the closer we got to Japan; it was certain that an invasion force would be attacked with far greater fury and recklessness. The military experts informed us that, from the facts at their disposal, they believed our invasion would cost us a million casualties, to say nothing of those of our Allies and of the enemy.

I reported these conclusions to the President. I also told him what the scientists, engineers and industrialists, who had come before the committee, had to say. He expressed the opinion that, regrettable as it might be, so far as he could see, the only reasonable conclusion was to use the bomb.

While we were aboard the *Augusta* en route to Potsdam, the final preparations were under way in New Mexico for the crucial test. The day the greatest blast the world had yet known was reverberating over the sands of Alamagordo, the President, Admiral Leahy and I were looking at the rubble that had been Berlin. Reports of the test, which had to be transmitted in top secret codes, did not reach us for several days. By that time, the conference was in full swing; I was so busy that I have never been able to recall the time and circumstances under which Secretary Stimson brought us the news. Another reason the moment made so little impression on me was that my work on the Interim Committee had already convinced me that the bomb would succeed. News of the test seemed simply a confirmation of a well-known fact.

Prime Minister Churchill, whose co-operation with President Roosevelt had contributed so much to the success of the great gamble, was intensely interested in the reports. He discussed the project at length with President Truman and was eager to hear from me about the work of the Interim Committee. In addition to his tremendous interest in the effect of the bomb on the war with Japan, he foresaw more clearly than many others the possibilities presented by the release of atomic energy.

We faced a terrible decision. We could not rely on Japan's inquiries to the Soviet Union about a negotiated peace as proof that Japan would surrender unconditionally without the use of the bomb. In fact, Stalin stated the last message to him had said that Japan would "fight to the death rather than accept unconditional surrender." Under those circumstances, agreement to negotiate could only arouse false hopes. Instead, we relied upon the Potsdam Declaration.

As soon as we had studied all the reports from New Mexico, the President and I concluded we should tell Generalissimo Stalin that we had developed the bomb and proposed to use it unless Japan acceded promptly to our demand for surrender. The Soviet Government was not at war with Japan, but we had been informed of their intention to enter the war and felt, therefore, that Stalin should know.

At the close of the meeting of the Big Three on the afternoon of July 24, the President walked around the large circular table to talk to Stalin. After a brief conversation the President rejoined me and we rode back to the "Little White House" together. He said he had told Stalin that, after long experimentation, we had developed a new bomb far more destructive than any other known bomb, and that we planned to use it very soon unless Japan surrendered. Stalin's only reply was to say that he was glad to hear of the bomb and he hoped we would use it. I was surprised at Stalin's lack of interest. I concluded that he had not grasped the importance of the discovery. I thought that the following day he would ask for more information about it. He did not. Later I concluded that, because the Russians kept secret their developments in military weapons, they thought it improper to ask us about ours.

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Two nights after the talk with Stalin, the Potsdam Declaration was issued. We devoutly hoped that the Japanese would heed our warning that, unless they surrendered unconditionally, the destruction of their armed forces and the devastation of their homeland was inevitable. But, on July 28, the Japanese Premier issued a statement saying the declaration was unworthy of notice. That was disheartening. There was nothing left to do but use the bomb. Secretary Stimson had selected targets of military importance and President Truman approved his plans. Shortly thereafter Secretary Stimson left for the United States.

Despite the Japanese Premier's statement, I continued to hope the Japanese Government would change its mind. I was greatly disappointed when August 2, the day of our departure from Potsdam, arrived and no further word had been received. I recognized then that our hope of avoiding use of the bomb was virtually gone.

The President had accepted an invitation from King George for a brief visit at Plymouth Harbor, where we were to meet the USS *Augusta* for the trip home. Because the law of succession placed the Secretary of State next in line for the presidency in case of the death or resignation of the President, President Truman and I traveled from Potsdam to Plymouth on separate planes. We landed at Harrowbeer, near Plymouth. Shortly thereafter Admiral Leahy and I accompanied the President aboard the battleship H. M. S. *Renown,* where King George entertained us at luncheon.

The King had learned from Churchill of the successful experiment with the bomb and was eager to know all about it. Most of our luncheon conversation was devoted to the bomb. The only one of the group who was skeptical about its success was Admiral Leahy and the King enjoyed joking with him about his pessimism. Admiral Leahy felt that the scientists greatly exaggerated the bomb's capacity to damage. Throughout the entire discussion, King George showed that, contrary to the impression of some Americans, he was well informed on the diplomatic as well as the military situation. His views on pending problems, in my opinion, were sound. Later in the afternoon, the King paid a return visit to the *Augusta;* when he departed, the *Augusta* started for home.

On August 6, the President and I had lunch with the enlisted men. A few minutes before twelve, Captain Frank H. Graham, the watch officer of the White House Map Room, hurried into the mess hall and handed the President a brief message from the Navy Department saying that Hiroshima had been bombed a few hours before. Ten minutes later Captain Graham was back with a second message, this time from Secretary Stimson. His report indicated that the results of the bomb were even more successful than the test had led us to expect. The President read the message aloud to me, and then stood and asked the crew to listen for a moment. He announced that he had just received two messages informing him of the highly successful results of our first use of a terrifically powerful new weapon with an explosive 20,000 times as powerful as TNT. As the President left the mess hall with the two messages in his hand, the crew clapped and cheered. He went to the wardroom, where he made the same announcement to the ship's officers, and again applause rang through the ship. A few minutes later, the ship's radio began to carry news bulletins from Washington about the bomb and the statement about its development, which the President had approved just before leaving Germany.

I thought that the bombing of Hiroshima, southern headquarters and depot for the homeland army, would convince the Japanese that the Allied nations meant what they said in the Potsdam Declaration. Millions of leaflets were dropped warning the Japanese that one out of ten listed cities would be the next target. We received no communication from them and so, on August 8, the second bomb was dropped on Nagasaki, a major seaport with many war plants.

As at Hiroshima the destruction in Nagasaki was terrific. The Emperor did not wait for further evidence of our intention to carry out the Potsdam Declaration. He broke the deadlock that had existed for several days in the Japanese Cabinet; on August 10, he submitted the offer of surrender. No one should doubt that the destruction wrought by the atomic bomb influenced the action of the Emperor and the Cabinet.

Those two bombs were all we then had ready for use, but others were on the way and some were expected to be even more powerful. In these two raids there were many casualties but not nearly so many as there would have been had our air force continued to drop incendiary bombs on Japan's cities. Certainly, by bringing the war to an end, the atomic bomb saved the lives of thousands of American boys.

No one who played a part in the development of the bomb or in our decision to use it felt happy about it. It was natural and right that men should worry about performing a duty that would cost so many human lives. Most of these men were civilians, but I have no doubt that all thinking men in the armed forces felt the same way about air raids, the dropping of incendiary bombs and similar actions which cost many lives. Being soldiers, they did not write to the press about their views as did the civilians. But the truth is, war remains what General Sherman said it was.

Shortly after Japan's surrender, many people demanded that we immediately give the world all the scientific and engineering information on the atomic bomb that we possessed. Most thinking people wanted international control of atomic energy. Some, however, were not so particular about safeguards necessary to protect us against a violator of the international agreement. I agreed with the scientists who argued that inevitably some other nation would produce an atomic bomb, but I felt that we should not shorten that period unless we were fully protected. I felt that if any nation were opposed to submitting atomic energy to complete control by an international organization, with safeguards against violations, then the longer we could keep the bomb out of the hands of that nation, the better it would be for the people of the world. I still feel that way.

On November 10, 1945, Prime Minister Attlee and Prime Minister Mackenzie King came to Washington to talk with the President about our future atomic energy policy. The day of their arrival President Truman invited his guests to accompany him on Sunday on a cruise down the Potomac aboard the presidential yacht, the *Williamsburg*. The party also included Lord Halifax, Sir John Anderson, Admiral Leahy and myself. That afternoon conversations began. They continued that night and for several days. On November 15, the President, Mr. Attlee and Mr. Mackenzie King held a press conference. They announced that the three governments agreed on the need for international action, under the auspices of the United Nations, to provide controls over atomic energy to insure its use only for peaceful purposes, to outlaw atomic weapons and other major weapons capable of mass destruction, and to provide for effective safeguards through inspection.

History will not disclose action by any governments comparable to this generous offer. It was only as a result of great expenditures that we, in co-operation with our Allies, the United Kingdom and Canada, developed a weapon so destructive as to frighten all thinking people. We could have held this weapon and used it as a threat to force concessions from other governments. Instead, the three governments hastened to offer the secret of this power to an international organization in order to have it used for peaceful rather than for destructive purposes.

I was scheduled to give a speech the following day at Charleston, South Carolina, on international trade, With the announcement of this historic agreement I rewrote the first half of the speech. I did not want to neglect a single opportunity to stress to our people the importance of

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controlling atomic energy "so that it may be used, not for war and destruction, but for the peace and happiness of the world."

In meeting the challenge of atomic energy, I said, we must "let our minds be bold." At the same time, I cautioned, "we must not imagine wishfully that overnight there can arise full grown a world government wise and strong enough to protect all of us, and tolerant and democratic enough to command our willing loyalty.

"If we are to preserve the continuity of civilized life, we must work with the materials at hand, improving and adding to existing institutions until they can meet the stern test of our time."

I described the plan announced in Washington the day before and said we realized that it was "a very modest first step in what is certain to be a long and difficult journey." I emphasized that even though we had advanced a program, "the creation and development of safeguards to protect us all from unspeakable destruction is . . . the responsibility of all governments."

"Without the united effort and unremitting co-operation of all the nations of the world," I said, "there will be no enduring and effective protection against the atomic bomb."

A month later, when Mr. Bevin and I went to Moscow, we took with us a very definite proposal based on the Washington agreement of November 15. It called for the establishment by the United Nations of a Commission on Atomic Energy and all weapons capable of mass destruction.

I proposed that we place the atomic energy resolution at the top of the agenda. Mr. Molotov objected and asked that it be placed at the end. I agreed, although I wondered why he took such a position. At first, I thought it might be because one of Russia's most distinguished scientists, reportedly an expert on nuclear physics, was reported by the press to be in Paris. I assumed Molotov wished to have him present for the discussions and therefore had suggested deferring the item. This theory was upset, however, when the scientist returned to Moscow and still did not attend the conference. I then came to the conclusion that Molotov's request had been made solely to give us the impression that the Soviet Government did not regard the atomic energy problem as important.

At Moscow, as at Potsdam and then at the Council of Foreign Ministers meeting in London, no member of the Soviet delegation expressed any curiosity about atomic energy. At Potsdam, neither Stalin nor Molotov had mentioned the matter after the President's talk with the Generalissimo. At London, Mr. Molotov showed no interest whatever; his only references to the bomb were a few offhand remarks about my carrying an atomic bomb in my pocket. I decided that I was right in the conclusion I had come to at Potsdam, that the Russians never disclose information about such a discovery to anyone else and so thought it would be improper for them to exhibit curiosity about ours.

Postponement of the atomic energy issue, however, meant considerable inconvenience for Dr. James B. Conant, president of Harvard University, who had generously agreed to accompany me to Moscow in an advisory capacity. He had done so expecting that, as soon as the atomic energy resolution was adopted, he could return home to the urgent business that was awaiting him. Instead, he had to sit through about ten days of discussion on totally unrelated issues.

Conant sat near me during most of the meetings. After being a silent observer for nearly a week, he leaned over to me one day and said:

"I think the President of every university in the United States should be forced to attend a conference of the Council of Foreign Ministers. They might then appreciate the patience required to reach agreement with our Soviet friends."

I felt like accusing him of harboring some secret animosity toward his fellow university presidents, but I appreciated his thought.

Dr. Conant's presence in our delegation was noted at length in the Moscow press. He and I fully expected that some of the Russian scientists would call on him. They did not.

One afternoon, Mr. Molotov entertained the three delegations. He is always a good host. In talking with Dr. Conant, Mr. Molotov remarked that, during his visit in Moscow, the president of a great university like Harvard should address the University of Moscow on the subject of atomic energy. That night Dr. Conant told me about Molotov's statement and said he was willing to make such a speech. He thought it would be one way to pierce the "iron curtain" and explain our views on atomic energy, but he was not sure Molotov really meant it. The following day I mentioned the matter to Molotov, saying that, if he were serious, Dr. Conant would be glad to address the university. Mr. Molotov said he had not been serious, that he had no authority to extend an invitation on behalf of the University, and that he had been only trying to be pleasant.

When we finally reached the subject of atomic energy, Mr. Molotov offered only a few amendments to our proposed resolution. With some revisions, we accepted the Soviets' suggestions. One dealt with the relationship between the proposed Atomic Energy Commission and the Security Council of the United Nations. As revised, the resolution provided that, in view of the Security Council's primary responsibility for the maintenance of international peace and security, the Security Council should issue directions to the commission in matters affecting security. It is obvious this must be done by the Security Council, which is in continuous session and which has the power to take action. The Assembly, on the other hand, is not always in session, and even when meeting it can only make recommendations.

The only paragraph of our proposal to which Mr. Molotov raised serious objection, provided: "The work of the Commission shall proceed by separate stages, the successful completion of each of which will develop the necessary confidence of the world before the next stage is undertaken."

Mr. Molotov argued that this was a matter to be determined by the commission. I told him it went to the heart of our whole proposal and that without it we would not offer the resolution. I stated that this language had been agreed upon by the President, Prime Minister Attlee and Prime Minister Mackenzie King and we would have to insist upon its retention. He withdrew his objection. As a result, the proposal that we had expected would provoke extensive discussion was agreed to with less debate than any other subject on the agenda.

At the Christmas Eve dinner given by Generalissimo Stalin, I told him about Dr. Conant's distinguished service as an educator and more particularly as one of the contributors to the success of the atomic energy project. Stalin was not so indifferent as Mr. Molotov had appeared to be. He said that, although scientists spoke a language he did not clearly understand, they did a wonderful work and he thought those American scientists responsible for the discovery of atomic energy were to be especially congratulated.

A few minutes later, Molotov, acting as toastmaster, proposed a toast to Dr. Conant and, in a good-humored way, expressed the hope the doctor did not have an atom bomb in his pocket. Dr. Conant responded in like good humor to the toast. Generalissimo Stalin, beside whom I was seated, arose and said he was not satisfied to dismiss Dr. Conant's work thus lightly. He

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believed, he said, that Dr. Conant and his associates had rendered a great service and he wanted to congratulate them upon their success.

During the few days between my return home from Moscow and my departure to London for the United Nations General Assembly meeting, I acted in anticipation of the adoption of our resolution. I appointed a committee to begin work upon plans to he presented to the Atomic Energy Commission when it was organized. The committee was composed of Under Secretary of State Dean Acheson, as chairman, the former Assistant Secretary of War John J. McCloy, Dr. Bush, Dr. Conant, and General Groves.

In London, the British Government presented the resolution, drafted at Moscow, to the General Assembly on behalf of all five permanent members of the Security Council and Canada. On January 24, just before the resolution was adopted without amendment by a unanimous vote, I made a short statement to the Assembly emphasizing the common responsibility for controlling atomic energy.

"The problems presented by the discovery of atomic energy and of other forces capable of mass destruction cannot be solved by any one nation," I stressed. "They are the common responsibility of all nations and each of us must do our part in meeting them. In meeting these problems we must realize that in this atomic age and in this interdependent world our common interests in preserving the peace far outweigh any possible conflict in interest that might divide us."

The day before the adoption of the General Assembly resolution, the committee I had appointed in Washington appointed a board of consultants with David E. Lilienthal as chairman. The other members were Mr. Chester I. Barnard, president of the New Jersey Telephone Company; Dr. J. Robert Oppenheimer, director of the Los Alamos atomic laboratory; Dr. Charles Allen Thomas, vice president of the Monsanto Chemical Company, and Mr. Harry A. Winne, vice president of the General Electric Company.

The so-called Acheson-Lilienthal report was the work of the committee and its Consultants. It was adopted and released to the public on March 28, 1946. In a foreword to that report, I referred to it as a "suitable starting point for the informed public discussion which is one of the essential factors in developing sound policy," and emphasized that "the document is being made public not as a statement of policy but solely as a basis for such discussion."

The report succeeded in its purpose. The discussion was nation-wide and the objectives the report set forth were received generally with approval.

The essence of the report was summed up by Undersecretary Acheson in a radio discussion on April 23, 1946, in which he said:

"In plain words, the report sets up a plan under which no nation would make atomic bombs or the materials for them. All dangerous activities would be carried on—not merely inspected—by a live functioning international authority with a real purpose in the world and capable of attracting competent personnel. This monopoly of the dangerous activities would still leave a large and tremendously productive field of safe activities open to individual nations, their industries and universities. . . . The extremely favored position with regard to atomic devices which the United States enjoys at present is only temporary. It will not last. We must use that advantage now to promote international security and to carry out our policy of building a lasting peace through international agreement . . ."

For the task of translating the various proposals stimulated by the Acheson-Lilienthal report into a workable plan, I recommended to the President the appointment of Bernard M. Baruch. During the recent war, as during World War I, he had rendered distinguished public service. He had been official adviser to me when I was Director of War Mobilization, meeting with me

regularly and helping with many problems; he had been an unofficial adviser to the President and the heads of several war agencies. He had earned a rest from public service, but, appreciating the importance of the assignment, he agreed to undertake the job. The President sent his name to the Senate on March 18, 1946. The appointment was greeted by the public with deserved acclaim, and his nomination was quickly confirmed.

The law governing our membership in the United Nations stipulates that our representatives in the organization and on its commissions must follow the policy determined by the President, transmitted through the Secretary of State. Accordingly, Mr. Baruch asked for a directive giving the American policy on atomic energy control. I asked him to help draft the policy. After several conferences between Mr. Baruch, his associate, Mr. John M. Hancock, Mr. Acheson and me, we agreed upon an extensive, eleven-page statement of policy. I submitted it to the President for his consideration. Later, the President, Mr. Baruch and I discussed it further and made some changes; the President then gave it to Mr. Baruch as his directive. In doing so, he advised Mr. Baruch to exercise his own judgment on the methods most likely to accomplish the stated objectives.

The policy of the United States, as described in that directive, was presented to the United Nations Atomic Energy Commission by Mr. Baruch on June 14, 1946. It was a noteworthy speech which began with this solemn injunction to the Commission:

"We are here to make a choice between the quick and the dead."

The United States Proposed the creation of an International Atomic Development Authority, to which should be entrusted all phases of the development and use of atomic energy, starting with the raw material including:

1. Managerial control or ownership of all atomic-energy activities potentially dangerous to world security.
2. Power to control, inspect, and license all other atomic activities.
3. The duty of fostering the beneficial uses of atomic energy.
4. Responsibility for research and development intended to put the authority in the forefront of atomic knowledge and thus to enable it to comprehend, and therefore to detect, misuse of atomic energy.

Mr. Baruch said that when an adequate system for control, including the renunciation of the bomb as a weapon, was agreed upon and put into operation and when punishment was provided for violation of the rules of control, then the manufacture of atomic bombs should stop; existing bombs should be disposed of pursuant to the terms of the treaty; and the authority given full information concerning the know-how for producing atomic energy.

The policy further provided that penalties be fixed for such violations as the following: (1) illegal possession or use of an atomic bomb or of atomic material suitable for use in an atomic bomb; (2) the seizing of any plant or other property belonging to or licensed by the authority.

Mr. Baruch drafted a group of men of unusual ability, including Mr. Hancock, whose services during the two world wars have been invaluable; Ferdinand Eberstadt, former Vice Chairman of the War Production Board; Herbert Bayard Swope, who had been an associate of Mr. Baruch in the War Industries Board in World War I; Fred Searls, Jr., who had served with me as special assistant in the Office of War Mobilization and also in the Department of State. He also called on Mr. Thomas F. Farrell and Dr. Richard C. Tolman, to assist him in representing the United States.

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From the beginning, he insisted the plan should provide that, once the treaty was ratified, any government violating its treaty obligation and developing or using atomic energy for destructive purposes should he subjected to swift and sure punishment; and in case of violation no one of the permanent members of the Security Council should be permitted to veto punitive action by the council. Our position was that the permanent members of the council should in this special situation agree in advance to waive the veto power.

The public was kept fully informed of everything that took place in the Atomic Energy Commission from June until November. When the Council of Foreign Ministers met in New York, Mr. Baruch and his associates conferred with me about the advisability of asking the Atomic Energy Commission to vote immediately on the principles of the United States proposal.

These gentlemen had been studying the problem for six months and were certain the United States proposal was generally acceptable to every member of the commission except the representatives of the Soviet Union and Poland. Their description of the tactics of the Soviet representative, Mr. Gromyko, was simply a restatement of the delaying tactics I had encountered on other questions in the Council of Foreign Ministers for over a year. They called my attention to the fact that the terms of two members of the commission would expire on December 31; if no action was taken by that date, in January Mr. Gromyko probably would move to postpone further action on the ground that the two new members should have time to study the problem. I knew they were right and agreed that they should act at once.

On December 5, Mr. Baruch presented his plea for immediate action to the commission and proposed a series of general findings and recommendations which encompassed the American plan. He pointed out that the commission and its committees had held over seventy meetings and were qualified to take this step. The commission, with the Soviet Union and Poland abstaining, agreed to act. Subsequently, on December 30, it voted to submit its first report to the Security Council with a recommendation that a comprehensive international system of control and inspection be established and its functions be defined by a treaty in which all the United Nations should be entitled to participate. Again, the vote was 10 to 0, with the Soviet Union and Poland abstaining.

The report recommended the establishment of an international agency to promote among alt nations the exchange of scientific information on atomic energy for peaceful ends; prevent the use of atomic energy for destructive purposes; and to exercise the controls necessary to insure its use only for peaceful purposes. It could carry out research and developmental responsibilities in order to remain first in atomic knowledge and would have the exclusive right to carry on atomic research for destructive purposes.

Representatives of the agency would be afforded unimpeded rights of ingress, egress and access for their inspections and other duties into, from and within the territory of every participating nation. The agency should have the right to prohibit the manufacture, possession and use of atomic weapons, provide for the disposal of any existing stocks of atomic weapons and insure the proper use of nuclear fuels adaptable for use in weapons.

The commission stated that the treaty should specify how to determine violations of its terms and should define the violations which would constitute international crimes. It also should establish how to enforce its measures and how to punish violators. Serious violations, it proposed, should be reported immediately to the nations that signed the treaty, the General Assembly and the Security Council.

The commission supported our contention that once the violations had been defined and the methods of enforcement and punishment agreed to, a violator should have no legal protection

by veto or otherwise, from the consequences of his act. The report also stated that a violation might be of so grave a character that the inherent right of self-defense, recognized in article 51 of the Charter of the United Nations, might be exercised.

Finally, the report provided that the treaty should embrace the entire program for putting the international system of control and inspection into effect and should provide a step-by-step schedule for the completion of the process. The commission would determine when any particular stage or stages had been completed and subsequent ones were to begin.

While Mr. Baruch was pressing for action on atomic energy, Mr. Molotov presented to the General Assembly of the United Nations a proposal for general disarmament. I did not take it seriously. What the Soviet delegation really sought was to combine the Atomic Energy Commission with a commission on general disarmament.

The record since January 1946 shows what would happen if this effort had succeeded. The Security Council has been unable to agree upon the relatively simple question of establishing military contingents to enforce the decisions of the United Nations. It is therefore easy to guess how long it would take a commission to agree on a general disarmament program, including the reduction of naval, air and land armaments—several years certainly. Therefore, if the two commissions were combined, there would be many more excuses for delaying an agreement on atomic energy control.

Despite the clear and obvious necessity for the control of atomic energy, and despite the existence of a plan which has won approval everywhere except with the Soviet Union and its satellites, agreement still seems remote. If we cannot agree upon the control of this one major weapon, we certainly cannot agree upon the limitation of all armaments. The Soviet Union does not take into consideration the fact that the United States proposals, as presented by Mr. Baruch, offer a pattern for control of more than atomic weapons. The resolution creating the Atomic Energy Commission specifically authorized it to investigate how to control other weapons of mass destruction. The pattern developed for atomic energy could be applied to these other weapons, such as bacteriological warfare. That pattern could mark the beginning of general and genuine disarmament, but the Soviet Union chose to ignore what could have been and what still could be a fruitful possibility.

The Soviet tactic was exceedingly smart. The word “disarmament” is very attractive to a war-weary world. But disarmament, to be effective, must look to the future. It is easy to see now what folly it would have been, when gunpowder was discovered, to start disarming by limiting the use of the bow and arrow. But that is what the Soviet Union, in effect, proposed.

The General Assembly insisted that the work of the Commission for the Control of Conventional Armaments be kept distinct from that of the Atomic Energy Commission. Nevertheless, the Soviet Union’s representatives have continued their efforts to merge the two.

I think I know their motives.

Through such a merger of issues they want to get away from the Atomic Energy Resolution, to which they agreed at Moscow and which was adopted by the United Nations. That resolution provides for safeguards and adequate inspection. It provides that the world should proceed by stages and that the commission must be convinced by inspection that one stage of the work is proceeding satisfactorily before it begins the next stage, This is the clause to which Mr. Molotov objected at Moscow, but finally accepted. I think he has regretted that agreement ever since. That section prevents a full exchange of information until the system of inspection and control is operating effectively. It would make it possible for representatives of the international organization, who may be nationals of another state, to inspect Soviet plants. This is in conflict with their whole system, which is based upon and sustained by secrecy.

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The Atomic Energy Resolution, therefore, is an agreement the Soviet Union wants the world to forget and which it urgently desires to see superseded.

The reason for this determined resistance to effective control is equally clear. Mr. Gromyko disclosed it recently when he stated that the American plan proposes that "a system of inspection be established in such a way that it should be given unlimited powers *and the possibility of interfering with the internal economic life of nations."*

It is unfortunate but apparently true that the Soviets think capitalist interference is more to be feared than atomic bombs. And protection of the Soviet economic system from that interference seems to be more important than the protection of humanity from the scourge of atomic warfare.

This fear also explains the Soviet stand on the veto as applied to atomic energy. Mr. Gromyko has said that the Soviet Union is not willing to subject the fate of its internal economy to a majority vote. The veto, he contends, is necessary to protect the sovereignty of the states. The Soviet leaders do not yet appreciate that civilization and not state sovereignty is at stake.

No one wants to interfere in the internal economic life of their nation, but Soviet suspicion of the outsider is so deep seated that they believe that any inspection made by representatives of the international organization, adequate to satisfy the rest of the world, would interfere in their internal affairs. Every statement Mr. Gromyko has made on the subject of disarmament and atomic energy control should be read and considered in this light and in the light of what the Soviet Union has done in these postwar years. One is forced to the conclusion that the United States must not agree to any plan that will make it possible for anyone, including the Soviet Union, to avoid effective inspection.

If the United States destroyed its bombs and agreed not to make any more and then desired later to violate our treaty obligations and make bombs, our alert and uncontrolled press soon would discover it and make public the violation of our pledge. But that is not possible in the Soviet Union. Should the Soviet Government obtain from the international organization the scientific information and the engineering know-how and decide to build a plant and produce bombs, no one outside the Soviet Union would know it until the Red Army was ready to use them. That would be too late.

I know the officials of the present Soviet Government assert that they scrupulously carry out agreements. I hesitate to charge them with violating agreements, but I do say they have a very peculiar way of interpreting some of them.

What, then, shall we do in case the Soviet Union refuses to join in a treaty containing the safeguards it accepted in principle in Moscow and in London, and which clearly are essential to effective control? The answer is not a happy one, but I see no other. We must pray that the Soviet leaders will change their minds, and while we pray, we must use our best efforts to develop better bombs and more of them. For our own protection, we must continue pushing forward the boundaries of our scientific knowledge.

This is a harsh judgment, but the nature of the weapon demands that we be realistic.

We have not been, and I do not believe we ever shall be, guilty of using "atomic diplomacy." Others might suspect us of it because that is what they would do under similar circumstances. But, as I said in Charleston, South Carolina, on November 16, 1945, the suggestion that we might use the atomic bomb "as a diplomatic or military threat against any nation is not only untrue in fact but is a wholly unwarranted reflection upon the American Government and people."

It is one of the inherent characteristics o£ our democracy that we can fight a war only with the genuine consent of our people. No President in the absence of a declaration of war by the

Congress could authorize an atomic bombing without running the risk of impeachment. No one who knows the peace-loving temper of our people can believe that our Congress would adopt a declaration of war contrary to our obligations solemnly undertaken, under the United Nations Charter. The history of 1914 to 1917 and of 1939 to 1941 is convincing proof of the slowness of Congress to declare war. There is surely no reason to believe that it would be more eager to engage in a future war more terrible than any we have ever known.

While we wait for the realities of the atomic age to penetrate the fears and suspicions of the leaders of the Soviet Union, we must not permit the magnitude of the United States initiative to become blurred in the minds of men. It is a record that clearly shows we do not wish to continue making atomic bombs.

Within one year after the successful demonstration of atomic power, the United States had done these things:

1. Secured the agreement of our collaborators in the discovery of atomic energy to place that discovery under international control.
2. Secured the co-operation of the five major powers in initiating machinery to consider plans for international control.
3. Secured the unanimous adoption of that proposal by the United Nations.
4. Devised a detailed plan for world control of nuclear energy by an Atomic Development Authority representing all the United Nations.
5. Established by act of Congress a civilian commission to exercise strict control over all fissionable materials.
6. Released radioactive materials (isotopes) for medical, biologic, and scientific research.
7. Presented to the United Nations Atomic Energy Commission our detailed plan for international control of atomic energy; and, within a few months after the end of that first year, secured approval for our plan from all but two of the members of the commission.

I do not agree with those who predict that should the Soviet Union continue to block that record of progress, mass destruction must follow in a few years. In the war just ended, the Germans and Japanese had poison gas and death-dealing germs, as did the Russians, the British and ourselves. That war was no polite tea party. It was brutal. Nevertheless, no nation dared use these terrible weapons because they knew the same weapons would be used against them.

In saying this, I do not minimize the danger. It would be unfortunate if hostile governments possessed atomic bombs. But, it would be even more unfortunate if we threw our bombs away, gave our information to an international organization with inadequate power to exercise effective control, and thus enabled another government to manufacture bombs without our knowledge far sooner than otherwise would have been possible.

The years ahead pose no greater challenge to mankind. In the time we have at our disposal, fear and suspicion may yet yield to the wisdom of insuring the use of atomic power for human welfare rather than for deadly warfare.

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6. Clement R. Attlee, ***As It Happened: The Autobiography of***, New York: The Viking Press, 1954, pp. 226-227.

As I have already stated, the project for making an atom bomb had been a secret confided to very few people. It had been one of our apprehensions during the war that possibly the Ger-

mans might have got ahead of us. Had this happened I do not see how we could have avoided defeat. In the event, the close cooperation between American and British scientists resulted in the Allies being successful. The immediate result was the ending of the war in the East and a change in the balance of power in the West. The immense forces of Russia that threatened to give her complete power in Europe were held in check by this terrible weapon in the hands of the West.

It had been realized that atomic energy might be used not to destroy but to aid mankind, although this might take time. An agreement for partnership in the atomic field between the United States, Canada, and Britain had been reached at the Quebec Conference in 1943, but the industrial use of atomic energy had been specifically conceded to the United States. The agreement in itself was loosely worded, and it was clear that the position would need to be clarified. Although British scientists had contributed very greatly to the development of atomic energy the actual work had been done in America, owing to war conditions.

Sir John Anderson had been the Minister principally concerned with this project, and at my request he continued in a special capacity to deal with it after the change of government. I decided that it was time to clarify the position with the Americans and arranged for Sir John and myself to go to Washington. I had to speak at the Lord Mayor's Luncheon on November 9, 1945; I went direct from the Mansion House to the airfield and landed at Washington at 9:30 the next day. We went at once to the White House, where I was to stay. There President Truman, Mackenzie King, and I began our talks. There was a State Dinner in the evening at which Mackenzie King, Herbert Evatt of Australia, and the other Commonwealth representatives in Washington were present; also leading members of the United States government and the Senate.

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7. George F. Kennan, *Memoirs*, *1925-1950*, pp. 471-476 Boston: Little, Brown and Company, 1967

Chapter 20: Last Months in Washington

In the final weeks of 1949, while I was already in process of turning the direction of the Planning Staff over to my successor, two things happened that gave a renewed acuteness to the various problems connected with the development of nuclear weapons. First, on September 19 we learned from the scientists and the intelligence experts that the Russians had indeed exploded an atomic weapon. Secondly, word reached us — shortly thereafter, I believe it was — that research on the production of an American hydrogen bomb (the "superbomb," as we then referred to it) had now advanced to a point where there was plainly a real possibility of its production. There would now have to be a presidential decision as to whether we wished to commit ourselves to the development of this new weapon. Since the question obviously had implications from the standpoint of our stance in the negotiations over the international control of atomic weapons with which the United Nations had been seized ever since 1946, it was clear that the Secretary of State would have to have a voice in the decision.

A number of us, including the late Robert Oppenheimer, felt that before proceeding with the development of weapons of a wholly new range of destructiveness, we should reexamine our situation with respect to the international control of atomic weapons generally, and make sure that there was really no possibility of arriving at international agreements that would obviate the need to embark upon this fateful course. Whether it was the Secretary who asked me to conduct such a reexamination or whether I did so on my own initiative, I cannot recall. In

case, I and others worked on the problem over the final weeks of 1949; and on or about January 20 I submitted to the Secretary a long report of my findings and views. Since I was no longer director of the Planning Staff, the report had the character of a personal memorandum, and committed nobody except myself. I consider it to have been in its implications one of the most important, if not the most important, of all the documents I ever wrote in government. I regret that governmental policy precludes its publication at this time.

I began (this is by my recollection; I do not even have any notes on the document) with an examination of our existing position in the problem of international control. If, I concluded, it was really our desire to see atomic weapons excluded eventually from national arsenals, then our existing position did not do full justice to such a desire. There were ways — not vital ones, perhaps, but also not unimportant — in which our position could be safely moderated with a view to bringing us closer to the views of the Russians and other powers. But, I went on to ask, was it really our desire to see atomic weapons thus abolished? Did we really wish to move in a manner that would bring us and the world closer to that goal? The answer to these questions depended, as I saw it, on the attitude we took toward such weapons as a factor in our own defense policies. There were two ways they could be viewed. One could view them as an undesirable necessity, the very existence of which we regretted and deplored — a form of weapon we were obliged to hold because we had no assurance against its development and use by others against us, but the use of which we had no intention of initiating in any military encounter. In this case, we would of course not base plans for defense upon the presumption of its use. Or one could view this form of weapon as essential to our defense; as something we could not conceive ourselves as living without; and as something we would therefore expect to use deliberately, promptly, and spontaneously in any major encounter, regardless of whether it was first used against us. In this case, we would obviously base our defense structure on the assumption of its first use; and we would place ourselves in this way in a position where we would presumably not be able to afford not to use it, if war ever came.

Our statements to date, I pointed out, had been ambiguous and inconsistent on this point. We had done lip service, when we spoke in international forums, to a desire to see atomic weapons abolished. But it was perfectly clear from statements made by our political and military leaders as well as from the understanding that had been permitted to rest with our own Congress and with our NATO allies, that we were basing our defense posture on such weapons, and were intending to make first use of them, regardless of whether they had been or might be used against us, in any major military encounter.

If this was really our position then, I said, there would be no point in readjusting our position in the international negotiations looking to the control or abolition of atomic weapons; for this was a direction in which we did not really wish to move.

The rest of the paper was devoted, then, to a plea — as earnest and eloquent as I was capable of making it — that before we decide to proceed with the development of the hydrogen bomb, thus committing ourselves and the world to an indefinite escalation of the destructiveness and expensiveness of atomic weapons, we reexamine once more, in the most serious and solemn way, the whole principle of the "first use" of atomic weapons or any other of the weapons of mass destruction; and I made it as clear as any language at my command could make it that if such a reexamination took place, my voice would be cast most decisively in favor of the abandonment of this principle altogether. It lay, I thought, at the heart of all our confusions. I did not question that we would have to retain weapons of this nature until we could arrive at some satisfactory understanding with others on their removal from national arsenals.

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But I described in words something along the lines of the following what I thought should be our public position:

> We deplore the existence of all weapons of indiscriminate mass destruction. We regret that we were ever obliged to make use of one. We hope never to have to do so again. We do not propose ever to do so, unless we are forced to it by the use of such weapons against us. Meanwhile, we remain prepared to go very far, to show considerable confidence in others, and to accept a certain risk for ourselves, in order to achieve international agreement on their removal from international arsenals; for we can think of nothing more dangerous than a continued international competition in their development.

In arguing for this position, I made the point that the mere cultivation of such weapons would sooner or later present serious problems of public understanding (in view of their suicidal nature) and would raise questions as between ourselves and our allies that would be disruptive in their effect on the workings of existing alliances. But more importantly still, I argued — as I was destined to argue many times in the public discussions of future years — that there was no victory and no security to be won for our people by the sort of destruction these weapons were capable of working: the results they could produce would mean at best only a deterioration of the conditions of civilization for people everywhere, including ourselves; the victories that mattered would never be real victories unless they involved changes — beneficial changes, changes leading in the direction of greater tolerance and forebearance and hopefulness — in the minds of men; and such changes could never be brought about by destruction, and particularly the destruction of innocent life, on so vast and indiscriminate a scale.

I cannot remember that this paper was ever seriously considered or discussed. Nor can I recall what was the reaction to it of the Secretary of State. If I had to make a guess, I should think it was probably one of bewilderment and pity for my naïveté. The views put forward here conflicted with what was already established military policy. They conflicted with the ideas we had formed as to where the essentials of our own defense were to be found. They conflicted with the reactions of Congress, the military establishment, and the public to the news of the detonation by the Russians of an atomic weapon. They conflicted with the views we had communicated to our European allies, and with the manner in which we had taught these latter to see the needs and the guarantees of their own defense. (Some of them would have been the first to react with alarms and indignation at the very idea of attempting to live in a world where *our* atomic weapons did not stand as the guarantee of *their* security.) These views conflicted, furthermore, with the highly inflated estimates of Russian conventional military strength that had already become ingrained (we will not, at this point, ask why) in the official assessment of NATO defense needs, and with the resulting belief on our part that we could never meet the Russians successfully on non-nuclear ground. They conflicted, finally, with the growing tendency in Washington (a tendency doubly fateful now, in view of the demonstrated Russian capacity for producing atomic weapons) to base our own plans and calculations solely on the *capabilities* of a potential adversary, assuming him to be desirous of doing anything he could do to bring injury to us, and to exclude from consideration, as something unsusceptible to exact determination, the whole question of that adversary's real *intentions.* In the face of all these conflicts, one could well understand it if the Secretary of State saw no usefulness, nor even anything worth serious discussion, in the set of views I presented. In any case, on January 31, 1950, only some ten days after their presentation, the President announced our intention of proceeding with the development of the hydrogen bomb; and I knew that my labor had been, once again, in vain.

Years later, for reasons wholly independent of anything I then said, some of the thinking embodied in this paper would seep through into public discussion and into the official thinking of our government. After a lapse of twelve years President Kennedy and Mr. McNamara would recognize, for example, the basic unsoundness of a defense posture based primarily on weapons indiscriminately destructive and suicidal in their implications, and they would move, as far as they could in the existing circumstances, to correct this anomaly. The experience of two wars in which, as it turned out, the use of such weapons would prove impracticable, would tend to bring to the minds of many people, for the first time, the thought that they might not be the answer to every military problem. The complications presented by the question as to who, within the framework of the NATO alliance, should control the use of such weapons in case of war would come to constitute in the 1960s a knotty problem in the relations between ourselves and our allies, would play a part in changing the nature of the alliance itself, and would thus reveal some of the deficiencies of such weapons as a basis for a collective defense policy. But at the outset of 1950 even these mildly encouraging responses were still many years in the future; and it will be understood that I came away with nothing other than a heavy heart and the deepest sort of discouragement from this — my first and last responsible contact with the formulation of our official policy toward the cultivation and use of the weapons of mass destruction.

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8. Dean Acheson, ***Present at the Creation: My Years in the State Department***, New York: W.W. Norton, 1969, pp. 164-168 y 344-349.

19. THE QUEBEC AGREEMENT

MY INTRODUCTION TO SECRET DIPLOMACY

DURING THE WINTER OF 1945-46 I learned about a matter that was to disturb me for some years to come, for with knowledge came the belief that our Government, having made an agreement from which it had gained immeasurably, was not keeping its word and performing its obligations. Like all great issues it was not simple. Grave consequences might follow upon keeping our word, but the idea of not keeping it was repulsive to me. The analogy of a nation to a person is not sound in all matters of moral conduct; in this case, however, it seemed to me pretty close. Even in *realpolitik* a reputation for probity carries its own pragmatic rewards.

When we entered the war, British scientific development was ahead of ours in some important areas, notably the electronics of naval warfare and the field of nuclear physics. To obtain the greatest security and benefit of all the material resources and scientific talent of our ally and ourselves in the development of a nuclear weapon seemed to dictate pooling them in our country and under our direction. Full agreement on doing so was not reached until the Quebec agreement of August 1943. Earlier in the war, even before we ourselves became belligerents, informal exchanges of information on weapons research and development had been carried out, including some interchange on atomic matters. General Leslie Groves was placed in charge of the "Manhattan District" in September 1942, when we were making ready our major establishments at Oak Ridge, Hanford, and in the New Mexico desert. General Groves was not a scientist, but he was a most capable administrator of this great Scientific project. As Robert Oppenheimer said of him, "he had a fatal weakness for good men."

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He also had reservations about full exchange of information regarding what was becoming an increasingly American effort. Secretary Stimson sought guidance from President Roosevelt, who decided that, pending a talk with Mr. Churchill, no more information should be shared than was necessary for the conduct of the project. The British protested but the President confirmed a recommendation of "interchange of information only to the extent that it can be used now by the recipient."

This was how matters stood when the agreement between the United Kingdom and the United States governing their collaboration in the development of "tube alloys," the British code name, was written down by the two heads of government at their August 1943 meeting in Quebec. Like so much of the writing emanating from their meetings, it was not a careful lawyers' document, but rather a memorandum of what they had agreed on so far as they had discussed the matter. It recited the decision to pool in the United States brains and resources to insure their most provident use and to speed the project, with the result that a far larger part of the expense had fallen on the United States. It was agreed that the parties would never use "this agency" against each other, nor would they use it against third parties without each other's consent, nor communicate any information about tube alloys except by mutual consent. Britain disclaimed any "post-war advantages of an industrial or commercial character" beyond what might be considered by the President of the United States to be "fair and just and in accordance with the welfare of the world." The agreement provided for a Combined Policy Committee of three American officials, two British, and a Canadian, which should agree from time to time on the program of work to be carried on, allocate materials, plant, and apparatus in limited supply, and settle questions arising under the agreement. Complete interchange of all information and ideas on all sections of the project should take place among the Policy Committee members and their advisers and on scientific research and development between those engaged in the same sections of the field. Interchange regarding design, construction, and operations of large-scale plants should be regulated by *ad hoc* agreements in the interest of the earliest completion of the project and approved by the Policy Committee.

The strict construction placed by American officials on the meaning of the agreement was spelled out for President Truman at the time of his November 1945 talks with Prime Minister Attlee. But the basic ambiguity surrounding the commitments, which was to give me so much discomfort, is underlined by another agreement of Churchill and Roosevelt in September 1944 that "full collaboration" between the two governments "in developing Tube Alloys for military and commercial purposes should continue after the defeat of Japan unless and until terminated by joint agreement." Three months earlier the two had established a Combined Development Trust, administered by six persons appointed and removable by the Combined Policy Committee and charged with acquiring, developing, and holding as the agent of the Policy Committee uranium and thorium supplies originating outside the jurisdiction of the two governments and the Commonwealth (i.e., at that time chiefly in the Belgian Congo). Its operations were to be financed equally by the two governments.

When the new President and Prime Minister met in November 1945 they agreed that there should be "full and effective cooperation in the field of atomic energy between the United States, the United Kingdom and Canada," that the Combined Policy Committee and the Combined Development Trust should be continued, and that the former should recommend arrangements to achieve this purpose.

So far as I can recall, my first knowledge of these highly secret and important affairs came shortly before Mr. Byrnes took me to a meeting of the Combined Policy Committee on February 15, 1946, called principally to recast the Quebec agreement. We had before us proposals

drafted by a subcommittee consisting of General Groves, Roger Makins of the British Foreign Office, and Lester B. Pearson. One of these proposals we were later to wish most fervently that we had put into effect at the earliest opportunity, as it would have changed the second article of the Quebec agreement to provide that atomic weapons should not be used against third parties without prior consultation between the two governments rather than "without each other's consent." However, the amendments were a "package," as the phrase goes, and some of them caused considerable concern, not least to their co-author, General Groves, who until the Atomic Energy Act of 1946 remained in charge for the Army of all our Government's operations in the atomic field.

The General, therefore, threw a monkey wrench into the negotiating machinery. He pointed out to Secretary Byrnes, who raised the objection in the meeting, that although the heads of government had directed the preparation of the amendments, the United Nations Charter, which took effect October 24, 1945, required the registration of all international agreements with the United Nations. Lord Halifax strongly opposed delay but Mr. Byrnes, who saw the propaganda advantage to the Russians in bringing to light active Anglo-American-Canadian agreements on atomic energy when we three were the proponents of international control, remained hesitant. He must discuss this problem with the President.

What particularly bothered General Groves were two changes in prior practice. One would alter the allocation to the United States of all ores obtained by both countries, as had been done during the war, in favor of an even division of ore on the ground that each country paid for half and should receive half. The other matter was the British request for technical information needed to build a large-scale atomic plant in the United Kingdom. The General argued that an even division of ore would soon bring our operations to a halt. We had used our only two atomic weapons and needed to make more, while the British could not yet use any ore. He also saw an atomic plant in England as far too vulnerable to Russian attack. If built at all, it should be built in Canada. The honeymoon of Anglo-American relations existing during the war was clearly coming to an end, and some of the commitments of the marriage seemed to be causing pain to one of the spouses.

A correspondence between President Truman and Prime Minister Attlee failed to resolve the issue of technical help in building the atomic plant. The President's view was that the exchange of information contemplated in the agreements related only to basic scientific research and that to enlarge the area while both the Atomic Energy Act of 1946 and international control through the United Nations were still pending would be a serious mistake. The Prime Minister argued that help on the plant had never been ruled out but retained as a possibility and that equitably it was justified by British help to us in the development of radar and jet engines.

When the raw-materials issue became deadlocked in the Combined Policy Committee, I was drawn into an attempt to work out an agreement, with Dr. Bush and General Groves as my colleagues working with Roger Makins and Sir James Chadwick on the British side. After much discussion the British representatives offered to recommend to London that the one hundred per cent allocation to the United States of all material going through the Combined Development Trust should continue through March 31, 1946, with the United Kingdom getting fifty per cent for the rest of the year without prejudice to different allocations in subsequent years. We recommended this solution to the Combined Policy Committee as one that would permit the United States to maintain its scheduled operations for the remainder of the year. The Secretary of War and the President approved on July 10, 1946.

By the time the President's correspondence with the Prime Minister had run down and the new allocation of raw materials had been made, the UN Atomic Energy Commission was con-

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vening for discussions that would focus on the American proposal for international control of atomic energy, and the Congress in August would greatly change the situation by its domestic control act. Neither the British Government nor ours believed the hour propitious for embarking on further discussions to amend the Quebec agreement. This still remained highly classified as top secret and became increasingly a source of acute embarrassment.

Indeed, so closely was knowledge of the Quebec agreement held that Secretary of Defense Forrestal did not know of it until some time after I did. What disturbed me when I did learn of it was the problem presented in our relations with Congress. The Administration had for some time been discussing with Congress, in considerable detail and apparently in complete candor, all aspects of both national and international control of nuclear energy and weapons, without mentioning the existence of so relevant and important a matter as this agreement. The somewhat incredible truth was that very few knew about it (due, in part, to so many changes in high office), and those who did thought of it as a temporary wartime agreement to be superseded by broader arrangements currently and constantly discussed.

The immediate problem seemed to be how to purge ourselves of an imputation of bad faith, a problem I was eager to have decided by my superiors and betters, the President and the Secretary of State. They, however, operating on the principle that the bearer of bad news should do something about it, sent me to the Capitol to begin by making a disclosure to Senator Vandenberg, share with him his first moments of anguish, and bear his recriminations. Since I was innocent myself, I could, at least, urge that while we at the other end of the avenue might be fools, we were not knaves. No competitors for the honor of this mission appearing, I performed it. Senator Vandenberg had with him his colleague on the Foreign Relations and Joint Atomic Energy committees, Senator Bourke Hickenlooper, Republican of Iowa. Senator Vandenberg later described the agreement I disclosed as "astounding" and "unthinkable." It was thinkable enough, however, to permit a considerable flow of words of a highly unfavorable nature from both senators. My role was to bear them submissively and patiently until a reduction in the temperature of the conversation returned the whole subject to the realm of the thinkable. When we had jointly thought about it for a while, the agreement appeared less unusual as a wartime agreement between allies engaged in the joint development of this horrendous weapon. Nor was it immediately clear that the best interests of either or both countries would be served by cutting off all relations between them on atomic matters. Doubtless the Quebec agreement needed modification in the light of the rapidly, and not too favorably, developing situation, but just what modification would require some thought and discussion with our British colleagues.

Later negotiations, resulting in the so-called *modus vivendi* of 1948, were carried on by my successor, Robert Lovett. These relieved the extreme apprehension of the senators but left the British with a sense of having been ungenerously, if not unfairly, treated. When I returned to office in 1949, the problem of our relations with the British on nuclear matters was still unresolved. Tackling it again, I found my views out of sympathy with the more extreme nationalist ones prevailing in the Congress and in some parts of the executive branch. I was not proud of the resulting governmental attitude. But all this belongs to later chapters.

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38. A REAPPRAISAL OF POLICIES

THE PRESIDENT'S INSTRUCTIONS

WHILE OUR EFFORTS had helped Europe make great strides toward recovery, this had not been so in the Far East. Nor had political unity in foreign policy been maintained at home. The

Nationalist Government of General Li had collapsed on the mainland before the victorious Communists, now supreme in every part of China. Their attitude was one of declared hostility to the United States, including the arrest and detention for over a year of Consul General Angus Ward and his staff at Mukden in Manchuria. Congress, still agitated over the publication of the White Paper on China, had been frightened in September by the announcement of the Soviet nuclear explosion.

Several days after my return from Europe in November the President met with our consultants on China, Philip C. Jessup, Raymond Fosdick, and Everett Case, for a long analysis of the reasons for the Communist success in China, looking toward some new policy conclusions when Ambassador Jessup returned from his approaching mission to China's neighbors. Reviewing the discussion with him later, neither of the principal alternatives open to us seemed inviting. A policy of harassment of the regime and seizure of every opportunity to weaken and if possible overthrow it offered little hope of success, short of massive military intervention-and not much even if that extreme measure were to be included. To encourage the influences that, over time, might detach China from subservience to Moscow, by a cautious application of our attitude toward Tito, would require first that the Chinese Communists follow Tito in stopping active abuse of us.

The President wished to be kept informed of our thought as it developed. Immediately, however, he put me to work on two even more pressing matters: the issue of whether or not to attempt development of a hydrogen bomb and a review of our foreign and military policy in the light of Moscow's atomic explosion. On the first of these he wanted recommendations from Secretary of Defense Louis Johnson, David E. Lilienthal, and me, and he wanted them quickly; on the second, as it ultimately transpired, Secretary Johnson and I were to report.

The international situation we were about to review not only resulted in intensified policies on the part of the Administration, but also led to intensified action by the opposition. The bipartisan foreign policy of the 1947-49 period gave way, from 1950 to 1952, to partisan infighting as bloody as any in our history. The essential difference in the two periods was that during most of the first the Republicans had looked forward confidently to a return to power, while in the second they looked back with bitter frustration to a fifth straight failure to retain or regain it. The success of the Chinese Communists and of Russian nuclear scientists at home and their subversive agents abroad, combined with the Administration's advocacy of political and military involvement in Europe and economic aid in undeveloped countries, produced in the pressure cooker of this frustration a veritable witches' brew. Sometimes it seethed; sometimes, under the influence of international crises, it simmered down. At the hands of one of the most unlovely characters in our political history since Aaron Burr, it was about to seethe.

The Soviet explosion and Communist successes in the Far East led the Administration directly to the United Command in Europe and the strengthening of our own and allied forces there, The Taft-Hoover neo-isolationist opposition drew the opposite lesson that we should rely on atomic weapons (later known as "massive retaliation") and move toward withdrawal of ground forces from abroad. Increased tensions in Europe and Asia led the Administration to turn to the State Department as never before for new polices to meet the new dangers. They led the opposition to conclude that State Department fumbling or worse was their cause, a conclusion confirmed for them by the trials of the leaders of the Communist Party and of Judith Coplon in New York, the conviction of Alger Hiss for perjury in early 1950, and the arrest of Klaus Fuchs in London for passing secret information to the Soviet Union, These and other accusations were used to fuse in the public mind criticisms of American foreign policy toward Europe and Asia with fears of disloyalty. All this occurred just as the Department was

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serving as the President's chief instrument for developing the foreign policy, to be followed by the United States for the next twenty years.

The Hydrogen Bomb Decision ☞ While the immediate cause of the review of our military and foreign policies was the Russian atomic explosion, we had been unhappy in the Department since, in the summer of 1949, the President had fixed the limit of the military budget at thirteen and a half billion dollars. In fairness to Secretary Louis Johnson, the zeal with which he undertook to impose this decision upon the uniformed services came more from royalty to the President and the zest of battle than from belief in it on the merits. However, he soon convinced himself on that score so completely that when reversal of the decision became necessary later on, he presented a major obstacle. Collapse of the Nationalist regime in China and the Soviet explosion made it clear that changes in power relationships were imminent. By October the Policy Planning Staff had started to work on a reappraisal of our position, inquiring initially whether the situation did not require a renewed attempt on our part to get international control of atomic energy. October also saw ferment in another agency. Commissioner Lewis Strauss of the Atomic Energy Commission had filed a memorandum proposing intensive work on the possibility of cracking the hydrogen atom and producing a hydrogen bomb. This led to a strong difference of opinion within the commission. On November 1 Senator Edwin Johnson of Colorado announced over television what he called the "top-secret" fact that the United States was at work upon a "super-bomb" that might develop "1,000 times" the power of the Nagasaki bomb.

In this situation Atomic Energy Commission Chairman Lilienthal came to see me on November 1. My education in nuclear physics had ended in 1946 with the impression gained from Dr. Robert Oppenheimer and other colleagues in the Acheson-Lilienthal group that the hydrogen atom could not be cracked. Lilienthal now told me that the chances seemed about even for doing it and that the commission's General Advisory Committee unanimously opposed Commissioner Strauss's proposal, while a majority of the commissioners tended in that direction. The reasons for this view varied: some believed the use of limited materials for experimentation would dangerously delay the production of atomic weapons, others that the chances of success were not so good as represented and that valuable time, effort, and material might be wasted.

A broader issue also evoked a great deal of moral fervor. This was that research should not be undertaken at all—the position Lilienthal has described as "forswearing development along this line." Enough evil had been brought into human life, it was argued by men of the highest standing in science, education, and government, through development of atomic weapons without adding the superhorror of thermonuclear ones. If the United States with its vast resources proved that such an explosion was possible, others would be bound to press on to find the way for themselves. If no one knew that a way existed, research would be less stimulated. Those who shared this view were, I believed, not so much moved by the power of its logic (which I was never able to perceive—neither the maintenance of ignorance nor the reliance on perpetual good will seemed to me a tenable policy) as by an immense distaste for what one of them, the purity of whose motive could not be doubted, describes as "the whole rotten business."

The Pentagon was strongly pushing a crash program. Lilienthal believed that the decisions involved were essentially foreign policy decisions, and, indeed, required a thorough review of our whole foreign policy. He left with me the memorandum of the General Advisory Committee and a list of persons whose views I might find helpful. By letter of November 10, 1949, the

President designated Louis Johnson, David Lilienthal, and myself, acting as the Special Committee of the National Security Council, to advise him regarding "whether and in what manner the United States should undertake the development and possible production of 'super' atomic weapons [and] . . . whether and when any publicity should be given this matter."

Meanwhile, the Policy Planning Staff, and George Kennan in particular, had been at work on an approach to international control of the atomic race, a study which George completed after he left the Planning Staff to devote himself to the. duties of Counselor to the Department on the first of the year. Immediately after my talk with David Lilienthal, I met with the whole Policy Planning Staff, all of whom recognized the far-reaching consequences of the even broader decision that now faced the President. The National Security Council also considered the need of a broad appraisal of the nation's foreign commitments, capabilities, and the existing strategic situation, and on January 5, 1950, began one. While Paul Nitze, Atomic Energy Adviser Gordon Arneson, and Legal Adviser Adrian Fisher were to work with me on the immediate problem of the H-bomb decision, Nitze, who succeeded to the post of head of the Planning Staff, would prepare for the broader inquiry being gestated by the National Security Council, supported in this effort by the whole Planning Staff.

Nitze was doubtful of the line of argument George Kennan had taken in his paper—a thesis he summarizes in his memoirs—that if we wished to secure nuclear disarmament we should renounce first use of atomic weapons; rely on other weaponry for deterrence and defense against all threats short of atomic attack—threats he regarded as unlikely and probably even impractical; and make every effort to reach international agreement on control, even at a certain risk. I could only join Nitze in measuring the risks on a different scale, the one on which NSC-68 was to be based.

From the outset, in trying to outline with these groups the field of inquiry relevant to the decisions, I became aware, without full comprehension, that our colleagues Kennan and Bohlen approached the problem of policy definition with a very different attitude and from a different angle from the rest of us. At the time, impatient with obscure argument, I had to push through it to do what the President had asked of me. Now, understanding better what they were driving at and why, it seems to me rather more important and interesting than its application to the particular issues involved. Their viewpoint, clearly and sympathetically put by Professor Paul Y. Hammond, deserves reading in full. It may be summarized, with some damage, in two points:

1. The attempt to compress into a manageable paper, "cleared" by superiors, the vast and infinitely complex considerations upon which such decisions as those involved here should rest, would so distort the issues presented as to affect the decisions.

2. The creation of such a document not only affects the immediate decision but also introduces into policy making a new rigidity that limits flexible response to unexpected developments and thus affects future decisions as well.

In short, concluded Professor Hammond, "at the extreme, the foreign service officer would . . . rely emphatically upon the personal skills and noncommunicable wisdom of the experienced career official and would view the requirements of large-scale organizations (such as the armed forces with their demands for forward planning) as a direct threat to the practice of this diplomatic art." On the other hand, the rest of us accepted "the necessity in the administration of large-scale operations of forward planning with all its rigidities, simplifications, and artificialities." At the time I recognized and highly appreciated the personal and esoteric skill of our Foreign Service officers, but believed that insofar as their wisdom was "noncommunicable," its value, though great in operations abroad, was limited in Washington. There major for-

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eign policies must be made by the man charged with that responsibility in the Constitution, the President. He rarely came to his task trained in foreign affairs, nor did his personal entourage. What he needed was communicable wisdom, not mere conclusions, however soundly based in experience or intuition, what the man in the street called "educated hunches." I saw my duty as gathering all the wisdom available and communicating it amid considerable competition. The alternative we have seen in doubtful operation in the Roosevelt, Kennedy, and Johnson administrations, when the President has used the White House staff as the agency for collection and evaluation of wisdom.

Due to the acerbity of Louis Johnson's nature, the Special Committee held only two meetings: one on December 22, the other on January 31. The first meeting turned into a head-on confrontation between Louis Johnson and David Lilienthal on the basic issue referred to us and produced nothing either new or helpful to the President. The issue as to whether the use of fissionable material in the experimentation on the H-bomb would be detrimental to A-bomb production would, it seemed to me, yield to further analysis; the "moral argument" appeared less persuasive as one examined it critically. Perseverance was necessary but not through meetings, so we examined one another's views and narrowed our differences by my shuttling among my colleagues.

As December wore on, Lilienthal and I seemed close to a recommendation to investigate the H-bomb, defer decision on production pending investigation, and immediately inaugurate a review of foreign and military policies, including the possibility of reopening discussion of international control of atomic energy. (Indeed, such a review was already under discussion in the National Security Council, which approved it on January 5, 1950.) The Defense Department's Scientific Adviser, Robert LeBaron, did not rule out such a program.

At this point Louis Johnson, becoming impatient with us, sent a memorandum from General Bradley directly to the President. Admiral Souers told me on January 19 of this unilateral approach, adding that communication could be held within the orderly Special Committee procedure if the committee would move soon. The President wished to do this, since he was being pushed by growing press and congressional speculation on conflicting views within the committee and on post-H-bomb policies. I too was very aware of this pressure, having recently engaged in a vigorous exchange of views with a group of senators which drew from me the remark that if their views should develop into governmental policies I would not want to remain Secretary of State—perhaps not the best argument to induce a change in their views. Reporting the committee close to—I hoped—unanimous agreement, I enlisted the Admiral's sympathetic interest in Lilienthal's desire for a thorough review of our foreign and military policies.

After Lilienthal and I had had another talk, the Special Committee met on January 31 in Admiral Souers' office, my former room in the old State Department. Having proposed that our report be restricted to recommendations and a statement to be made by the President, I had given my colleagues drafts based on the recommendations previously discussed with Lilienthal. He thought they did not go far enough and was further depressed when Louis Johnson objected to any statement that a decision on production should be postponed until after research was completed. Both Lilienthal and I foresaw correctly that the purpose was to open the way for renewed pressure for a decision on production. However, nothing we recommended could prevent this, and I agreed.

Lilienthal then stated eloquently and forcefully his objection to authorizing investigation and research while a review of our policies was going on, since this, he believed, would extinguish whatever faint hope there might be of finding a way to prevent development of the

weapon. Equally or even more important, to launch out on the path toward the H-bomb with so much haste would tend to prejudge defense budgets and strategy and their relation to foreign policy. He believed other weapon systems were needed more. Much that he said was appealing, and in our later review we were strongly persuaded toward increased conventional capability. But I could not overcome two stubborn facts: that our delaying research would not delay Soviet research, contrary to an initial hope I had briefly entertained; and that the American people simply would not tolerate a policy of delaying nuclear research in so vital a matter while we sought for further ways of reaching accommodation with the Russians after the experiences of the years since the war.

The paper was retyped after editorial changes agreed on by Johnson and me. To my considerable surprise Lilienthal signed it, although insisting that he wished to express his views to the President. The three of us with Admiral Souers crossed the street to the White House to present it. After the President had read the short recommendation and proposed statement, I asked him to hear some additional views from Lilienthal. David began an outline similar to the one he had given us but was soon interrupted by the President, who signed the recommendations and the statement, saying that he felt further delay would be unwise. Later the same day, acting on our recommendation, he instructed the Secretaries of State and Defense "to undertake a re-examination of our objectives in peace and war and of the effect of these objectives on our strategic plans, in the light of the probable fission bomb capability and possible thermonuclear bomb capability of the Soviet Union."

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9. Gladwyn, Lord, *The Memoirs of*, New York: Weybright and Talley, 1972, pp. 261-267.

In 1945 I had had some very rudimentary ideas about how to cope with the nuclear problem. In the late forties, while still in the Office, I had had further thoughts, which I developed at much greater length in New York during 1951 and 1952. It was not my specific field, but after all if you were concerned with the UN you could hardly be unconcerned with a problem on the solution — or non-solution — of which the whole new world organization might depend. At this time the official Anglo-American view was still simple enough. The USA no longer had a monopoly of nuclear power, but its lead over the USSR was still very great and might, for all one knew, continue. The Baruch plan, for the control of nuclear energy by internationalization, even if it ever had been workable, which was doubtful, had died as long ago as 1947; and short of some kind of nuclear arms limitation involving an almost impossible system of inspection, no real progress appeared to be practical politics. Perhaps this situation was tolerable in the forties, but early in 1950 there was already talk of the 'Super', or Hydrogen Bomb the appearance of which on the scene would clearly change the whole situation. Foreseeing this development, my view early in 1951 was that the best thing might well be to seek a convention banning the use of the nuclear weapon altogether in war.

A little later, while maintaining this proposal, I had reached the conclusion that, whatever the theory might be, in practice the arrival of the Super Bomb would result in both the Super-Powers doing everything to prevent war from breaking out as between themselves. Control over its production seemed most unlikely, but as a Third World War was even more unlikely that perhaps did not matter so much. Europe was in a particularly vulnerable position since (this was before the arrival of rockets and missiles) the Russian nuclear bombs could be ex-

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ploded over that part of the world much more easily than they could over North America, so from our point of view we had every reason for supporting a 'ban the bomb' policy. And even if we thought a nuclear war most improbable we should, perhaps, in view of our exposed position not only get an assurance from the Americans that they would not deploy nuclear weapons against Russia from British bases except with our consent, but also make some precautionary shelter measures. But the logic of the situation, as I saw it, pointed increasingly to the necessity of the two Super-Powers coming together on some European settlement which they could both live with. And this we should foster to the limit of our power.

In 1953 I reverted to these thoughts and to the arguments that had always been deployed against them, namely (a) that if we agreed to any ban we should be debarring ourselves from using the only weapon in which we still had a superiority, and (b) that we should be at a great disadvantage if we had to wage a war with conventional arms only. But within a few years would (a) still be true, and as for (b) would that not be a position in which we should be anyhow? I tended therefore to support the initiative of Khrishna Menon, who was then agitating in favour of a ban-the-bomb-in-war convention in UN circles. With Menon I did not normally agree, but on this point I thought there was a good deal to be said for his general attitude.

The doctrine of the preponderance of power was, however, still orthodox in the Western world and naturally I accepted it as such in all public utterances. But I continued to think in my *'for intérieur',* as the French say, that it would one day have to be abandoned; and at the beginning of 1954 I again criticized it in a long private letter to Ivone Kirkpatrick as essentially 'negative', the broad argument being as follows. If we (the West) did not want to force a settlement in Europe then we should one day have to contemplate a political settlement, and with this the 'preponderance' doctrine was not really compatible. Maybe we should have to rely on 'tactical' nuclears for the defence of Europe, but would this be of much avail if the Russians had them too? The distinctions between nuclear and conventional weapons seemed in any case to be becoming increasingly blurred.

My conclusion was that the Russians would avoid a war at almost any cost until and unless they had 'neutralized' Germany, Turkey and Japan: that failing such conditions, they would seek to avoid charges of 'aggression', but would fight if forced to do so to protect their existing position; that, logically, and from a strictly military point of view, the West should nevertheless present some 'ultimatum' to the USSR demanding their evacuation of Eastern Europe; that in practice the West could and would do no such thing; that stalemate in Europe could therefore have to persist until such time as it was quite clear that a deal would have to be reached on a basis of nuclear parity; and that when that point was reached it would be obvious that the nuclear weapon did not confer on the West any particular military advantage. Looking back, it occurs to me that what I was really groping after was what actually happened some fifteen years later, namely the Treaty on Non-Proliferation and the kind of limitation which lies at the back of the Soviet-American discussions known as SALT. But I only give the bare bones of the mountainous correspondence in which my ideas were embedded to give the reader an impression of how my own thought developed and with what I occupied much of my time.

Before leaving the American scene, I ought also to explain very briefly, for, after all, it was my *raison d'être,* the general theory about the role of the United Nations that I developed during the second part of my stay. For the first year or so all was clear; we were fighting unprovoked aggression along with the Americans, and that was that. It was the 'glad, confident morning' of the UN. But when in the late spring of 1951, after the sacking of MacArthur, the military line became stabílized once more north of Seoul and the only outstanding question

was how to negotiate an armistice (which took another two years), the whole future of the world organization inevitably came under review and I made a series of speeches all over America in which, with the approval of the Department naturally, I increasingly sought to disseminate the idea that it was chiefly the avoidance of hostilities on which the UN ought to concentrate, and not so much on how to resist aggression by military means if unfortunately aggression should occur, this task being left to regional bodies, such as NATO, which (in the continued absence of the Military Staff Committee — see pp. 143-4, 170) alone had the physical means of carrying military measures into effect.

In so doing I frequently had recourse to the simple principle on which the UN had had, perforce, to be constructed, namely that of a minimum of harmony between the five — or at any rate the two — major powers. Since it was just not possible to impose the will of a majority of nations, however democratic, on one of the two Super-Powers, however despotic, without recourse to force, which would mean another world war, it was necessary to accept the Veto as a condition of any world organization. If it were abused in the event of a flagrant aggression it might, and indeed it would, be necessary for the majority, and notably for the USA, to go to the assistance of the victim; but in practice this would mean either America's taking military action all by herself, or by enlisting the aid of those friendly powers who were in a position to assist her. And such powers could in practice only mean NATO. The USA, who would have to take the lead because without her nobody could or would come out into the open against a Power backed by the Soviet Union, could also, with the resolution 'Uniting for Peace' (see p. 241) invoke the moral, and to some slight extent the material backing of any members of the General Assembly who were so disposed. But in the circumstances contemplated the UN itself would have been disrupted. All states, including one Super-Power, supporting the 'aggressor' would have automatically left. And many others, feeling 'neutral' might well also have withdrawn. All that really remained would be the name and the flag which would in effect become the property of one group inside the world organization. And the core of this group would be NATO. It could hardly be anything else.

But all that did not mean that the UN did not have an important political role to play, in the political field, where, even then, it was to some extent side-tracked. It could, after all, summon the disputants; propose solutions, encourage mediation; even send out peace observers and, occasionally, peace missions of specially recruited troops with the object, so far as possible, of holding the fort and separating the contestants. It had had a real success in Palestine, where it had been of the greatest use in ending hostilities, and it had also largely kept the peace in Kashmir. There was no reason why, provided the Super-Powers were not violently engaged one way or the other, it could not have similar, limited successes in the future. And in any case was it not a fact that it was in the UN building that the first contact had been made (actually, I believe, between Dr Jessup and Mr Malik in the washroom) which eventually resulted in the Russians calling off the Berlin blockade in 1949?

What I thought misconceived (and to prevent this was the real purpose of my many interventions) was the suggestion that the UN would be far better off without the Russians, their allies, or indeed without the neutrals. Then it could organize itself, so it was often suggested, without any let or hindrance against 'Communist Aggression'. In some ways this resembled the Herbert Hoover thesis of a basic Anglo-German-American-Japanese alliance run from the United States, in other words a sort of Fortress America with certain peripheral allies. In answer to this I said, and repeated many times, that NATO after all existed, to say nothing of other regional groupings too, all of which were directed against 'Communist Aggression'. What was the point, this being so, in disrupting the world organization? To do so would only

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result in a rival world organization — in Tashkent or somewhere — and would in any case tend to drive the Russians and the Chinese together like nothing else.

The Foreign Office, though they agreed in principle with this rather stark thesis — and of course it was nothing like as stark as I have perforce had to represent it in this briefest of outlines — were nervous of its effect on the American public which had, from San Francisco onwards, been well oversold on the United Nations. Might I not be in some danger of actually encouraging that isolationism which it was my principal object to discredit? A very long correspondence ensued, but on the whole my thesis was thought to be less dangerous than the alternative one of encouraging false hopes and I was allowed to proceed. This I did increasingly and all over the country. In Britain, so far as my voice was heard, which was not much, the line was approved, and I got a very appreciative letter from Judd, the secretary of the United Nations Association.

Not so in the United States, where it encountered substantial criticism, both in the press and among the *cognoscenti.* Jack Hickerson of the State Department weighed in with a long reasoned piece, and so did the great Ham Armstrong, with an even longer one. I had also a very long discussion with Ernie Gross and that high priest of UN orthodoxy, Leo Pasvolsky. The main line of criticism was always the same. I was wrong to suggest — not that I had suggested in so many words — that it was not the 'primary purpose' of the UN to resist and counter 'aggression', by force if need be. The reaction to the Korean aggression had been the UN's finest hour. Why should it not, if necessary, rise to the occasion again if necessary? Yet even at the finest moment — that is to say immediately after the UN had gone into action in Korea — a number of states had concentrated chiefly on ways and means of ending the conflict peacefully, and notably by taking into consideration the views of a neighbouring Communist Great Power. The UN, Ham thought, had seldom been seen to less advantage than when a group of members within it 'seemed ready to take the line of mediator between victim and aggressor in Korea'.

Naturally I saw what the American experts meant and appreciated the importance which they attached to the general notion of the UN's standing for a simple principle of general application, namely collective resistance to aggression. But just as in my thinking about the nuclear weapon I had arrived at the conclusion that 'Western' theses could not be acceptable for ever, so, in the wider political field it appeared to me that we should one day have to come to some political settlement with the forces of the East. And it was in helping on such a *rapprochement* that, as I saw it, the real future of the UN lay. Of course the West must not, if possible, decline in strength as compared with the East. Of course it must maintain its democratic and libertarian ideas. Of course it should be ready to resist successfully if attacked. But one day it might be that, confronted by a dynamic but by no means dangerous West, the forces of the East would become less fearsome and thus, possibly, less totalitarian. It was in expectation of this day that the UN should be maintained as a whole and not be allowed to break up.

I do not think I convinced my critics, but they were apparently to some extent impressed by my views. Anyway, Ham suggested that I might formally record them in an article in *Foreign Affairs.* I said I would have to consult the Foreign Office who were at first reluctant to agree. It was then against convention that a serving member of the Foreign Service should express contentious and personal views in print on major political issues with which he was concerned. Strang felt, at first sight, that this should be the privilege of ministers. But eventually it was agreed that it might be to the general advantage that someone who still had a considerable personal following in the USA should be authorized to put forward a thesis which was, broadly speaking, acceptable to the Government and with which they therefore presumably hoped that

the Americans would agree. And so the article did appear in the April 1953 issue. Nobody re-reading it now would think it particularly heterodox!

In December 1953, Eden, who was staying with us at Wave Hill, the lovely, early nineteenth-century house on the banks of the Hudson in Riverdale which we had taken after leaving Cadogan's house in Oyster Bay, did me the great honour of offering me the Paris Embassy. Although the prospect of living for several years in Paris was delightful, I would have preferred to be Permanent Under-Secretary of State in the Foreign Office and said so, to no avail. It really did seem to me, however, that I was better qualified to be a Foreign Office official than a *mondain* diplomat. Such qualifications as I possessed lay, I thought, more in the realm of administration and of the formulation of policy. Nor was it my strong point to be terribly nice to people, to think up little schemes on how to get round difficult points, to flatter the great, and so on. However, I did my best to act the part. And in doing so I was much assisted by my wife who is a natural hostess and who for her part much preferred being Ambassadress in Paris to being the mere wife of the Permanent Under-Secretary in London.

Still, one is a poor judge of one's own case and it may well have been that Eden's judgment was correct and that I was better suited to Paris. And as I say, the prospect of living in that beautiful house, which we knew so well, and of seeing our French friends whom we loved so much, was in itself most alluring. I did try a little later, on the quite mistaken assumption that this would be either possible or desirable, to get myself appointed our representative to NATO as well (NATO then being situated in Paris). Some members of the NATO Council were at that time, I understood, also Ambassadors to France and it occurred to me that there might be certain advantages in this example being followed by us. Suitable (diplomatic) ministers might, I thought, do most of the work on both sides of the house and the Ambassador could *planer au-dessus.* There were then, as a matter of fact, no less than three British Ambassadors in Paris to France, to NATO and to OEEC. What I ignored in making this suggestion was that there might well be — as they say in the City — a 'conflict of interests' between the work of the British Ambassador to France and the British Representative to NATO, the latter having, perhaps, to take a strong line which might, in principle, not be in accordance with the desires or indeed with the instructions of the former. So the suggestion was, very properly, turned down, and I certainly found on arrival that there was quite enough for me to do as Ambassador to France anyhow. That there might well be a 'conflict of interests' in such a double job was, I believe, conclusively demonstrated some eight years later when my poor colleague, Bob Dixon, one of our foremost diplomats, led our official delegation to Brussels for the first negotiations on the entry of Britain into the EEC. Not only did the additional work shorten his life, but owing to the difficulties encountered with the French in Brussels, he was often much embarrassed in his capacity as Ambassador.

So we left New York in March and I made a final, and I fear rather dull speech to the Pilgrims. It did at any rate show that we were sorry to leave, which in many ways was true. But, politically, the UN was getting less exciting and, on the whole, more difficult. The great days when we and the Americans largely ran the show were over. The era of the 'under-developed' countries was about to begin. Racial superiority, great-power domination, neo-colonialism, etc. were becoming greater public enemies than dictatorship or aggression. In fact the latter were becoming almost fashionable. I doubted whether I was the right man to cope successfully with the now popular issues. For this the United Nations had to await Lord Caradon. It was time for me to retreat once more into the less-exposed world of diplomacy. So we sailed down the Hudson River without too many regrets.

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The Use of Atomic Bombs Against Japan[5]

The Strategic Air Offensive against Japan had been as pitiless as that against Germany, particularly the firestorm created by the great Tokyo Raid of 10 March 1945, in which 334 B-29s flattened 16 square miles of the capital, killed 83,000 people, injured 100,000 and rendered 1.5 million more homeless. It is regarded as the most destructive conventional bombing raid in history, and even bears some comparison with the nuclear bombs that were to come, although it has excited nothing like the amount of moralizing. With Mustang P-51s escorting the B-29s from Iwo Jima, the USAAF was able to establish almost complete air superiority in the skies over Japan for the last three months of the war; indeed major raids were undertaken from there even while there were still Japanese holding out in different parts of the island. Yet, although the bombing left ordinary Japanese – especially of course the city-dwellers – terrified and demoralized, there was no appreciable pressure put on the Government to end the war which all rational Japanese (including, it is alleged, Emperor Hirohito) could see was suicidal and unwinnable. The military clique that ran the Japanese Government felt no inclination to surrender, a course of action which they considered dishonourable.

Almost half of the residential area of Tokyo was destroyed by the end of the war, aided by the flammability of much of the paper and wooden housing. No fewer than 750,000 incendiary bombs were dropped at very low altitudes by 500 US bombers on the single night of 23 May, and a similar number the next night too. Yet Japan's reaction, or at least that of her Government, was to fight on, and a resigned but obedient population, which had little practical alternative, went along with the decision. It was not until 22 June 1945 that resistance on Okinawa ended, nearly three months after the US forces had landed on an island that was 60 miles long but rarely more than 8 wide. On the very eve of victory, [Lieutenant-General Simon Bolivar] Buckner was fatally wounded by an artillery shell at an observation post on the front line, the most senior Allied officer to be killed by the enemy in the whole war. Four days later, Lieutenant-General Ushijima committed *hara-kiri* just as his command post was finally overrun. In all, 107,500 Japanese were known to have died in the battle, an additional 20,000 were buried underground in their caves during the fighting, and only 7,400 surrendered. To set against these numbers, the US Tenth Army lost 7,373 killed and 32,056 wounded, with a further 5,000 sailors killed and 4,600 wounded, a total of nearly 50,006 American casualties for one Pacific island. In the skies the ratios were much the same: some 8,000 Japanese planes had been lost in combat and destroyed on the ground, against 783 US naval aircraft. Japan's Navy and Air Force were now in no position to oppose an American landing on the mainland, but, as her Army had shown, this was expected to be a bloodbath, for both sides.

The collapse of the Imperial Japanese Navy, as well as the mining of Japanese ports by B-29s, meant that the American naval blockade that had been in effect since 1943 would eventually starve the over-crowded island into surrender, though not for many months or possibly longer. No fewer than 4.8 million tons of Japanese merchant shipping were sent to the bottom by US submarines in the course of the war, 56 per cent of the total, and that did not include 201 warships, comprising a further 540,000 tons. It came at the grievous cost of fifty-two US submarines, however, and thus the worst death rate of any branch of the US armed forces, even higher than the bomber crews of the Eighth Air Force.

[5] Andrew Roberts, *The Storm of War: A New History of the Second World War*, New York, Harper, 2011, pp. 571-577. The footnotes have been omitted.

The situation that beckoned General MacArthur, Admiral Nimitz and General Marshall's operations planning Staff at the Pentagon in the summer of 1945 was an unenviable one. They had to consider a Japan that by any rational criteria was defeated, but which was not only refusing to surrender but seemed to be preparing to defend the sacred soil of her mainland with the same kind of fanaticism seen on Saipan, Luzon, Peleliu, Iwo Jima, Okinawa and many other places. Few doubted that Operation Olympic – a strike against Kyushu slated for November 1945 – and Operation Coronet, an amphibious assault in March 1946 against the Tokyo plain on Honshu, would lead to horrific loss of Allied life on the ground, however well the B-29s of the Twentieth Air Force and carrier-based task forces managed to soften up the mainland first. Estimates of expected casualty rates differed from planning Staff to planning Staff, but over the coming months – perhaps years – of fighting anything in the region of 250,000 American casualties were thought to be possible. 'If the conflict had continued for even a few weeks longer,' believes Max Hastings, 'more people of all nations – especially Japan – would have lost their lives than perished at Hiroshima and Nagasaki.'

It was against that background of looming dread that on 30 December 1944 General Leslie Groves, the head of the Manhattan Project, reported that the first two atomic bombs would be ready by 1 August 1945. At last an end to the war was in sight; and one that did not involve having to subdue the Japanese mainland. The means to be employed had not existed before, and were scientific, but it was hoped that the very newness of the technology might give the peace party in Tokyo – assuming there was one – an argument for why Japan could not fight on. 'Wars begin when you will,' wrote Niccolo Machiavelli in *The Prince*, 'but they do not end when you please.'

In the peroration of his 'finest hour' speech of 18 June 1940, Winston Churchill conjured up the vision of a nightmare world in which a Nazi victory produced 'a new Dark Age made more sinister, and perhaps more protracted, by the lights of perverted science'. The Nazis did indeed pervert science for their ideological ends, but then of course both sides tried to harness scientific developments for victory. Lieutenant-General Sir Ian Jacob, the military secretary to Churchill's War Cabinet, once quipped to the author that the Allies won the war largely 'because our German scientists were better than their German scientists', and in the field of atomic research and development he was undoubtedly right. Werner Heisenberg's atomic programme for Hitler thankfully lagged far behind the Allies', codenamed the Manhattan Project and based at Los Alamos in New Mexico. Because Hitler was a Nazi, he was unable to call upon the best scientific brains to create a nuclear bomb. Between 1901 and 1932 Germany had twenty-five Nobel laureates in Physics and Chemistry, the United States only five. Then came Nazism. In the fifty years after the war, Germany won only thirteen Nobel Prizes to America's sixty-seven. The list of those émigrés from Fascism – not all of them Jewish – who went on to contribute to the creation of the nuclear bomb, either at Los Alamos or in some other significant capacity, is a very long one, including Albert Einstein, Leo Szilard and Hans Bethe (who all left Germany when Hitler came to power in 1933), Edward Teller and Eugene Wigner (who left Hungary in 1935 and 1937 respectively), Emilio Segre and Enrico Fermi (who both left Italy in 1938), Stanislaw Ulam (who left Poland in 1939) and Niels Bohr (who escaped from Denmark in 1943). By denying himself the scientific brains necessary to create a Bomb of his own, Hitler's Nazism meant that he had persecuted the very people who could have prevented his own downfall.

Nonetheless, Hitler's scientists did come up with an impressive array of non-atomic scientific discoveries during the war, including proximity fuses, synthetic fuels, ballistic missiles, hy-

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drogen-peroxide-assisted submarines and ersatz rubber. Rabelais wrote that 'Science without conscience is the ruin of the world,' and all too often Hitler's scientists – such as the rocket engineer Wernher von Braun – ignored the suffering that their work created, including, as in Braun's case, tens of thousands of people working under slave-labour conditions to build the installations for his weaponry. (After the war, Braun headed President Kennedy's space programme, his career in rocketry saved by the fact that he had once briefly been arrested by the SS when Himmler had wanted to take over one of his projects.)

When in August 1939 Albert Einstein had written to President Roosevelt to inform him of the incredible potential of uranium, FDR's instinctive response was 'This requires action.' Sure enough, with huge investment in people and resources, and close collaboration between the American, British, Canadian and European anti-Nazi scientists, the Allies built two atomic bombs, codenamed Little Boy and Fat Man (supposedly references to Roosevelt and Churchill, though why FDR was little or a boy is anyone's guess). These scientists had discovered the secret to the vast force that held together the constituent particles of the atom, and how to harness it for military purposes. President Truman had few qualms in deploying a bomb that would undoubtedly kill tens of thousands of Japanese civilians, but would also, it was hoped, bring to a sudden halt the war.

At 08.15 on Sunday, 6 August 1945 (local time), the 9-foot 9-inch-long, 8,000-pound Little Boy was dropped from 31,600 feet over the city of Hiroshima, some 500 miles from Tokyo. It had been flown from the island of Tinian in the Mariana Islands in the B-29 Super-fortress *Enola Gay*, named after the mother of its pilot, Lieutenant-Colonel Paul W. Tibbets Jr, commander of the USAAF 509th Composite Group. The gigantic bomb detonated forty-seven seconds later 1,885 feet above the centre of the city which was home to a quarter of a million people, generating a blast of 300,000 Celsius for 1/10,000th of a second. Every building within a 2,000-yard radius of the hypocentre was vaporized, and every wooden building within 1.2 miles. Altogether 5 square miles of the city were destroyed, or 63 per cent of the city's 76,000 buildings. A huge, mushroom-shaped cloud then rose 50,000 feet over the city. In all, including the civilian deaths of 118,661 and perhaps another 20,000 military deaths, and many who died of radiation sickness afterwards, around 140,000 people were killed.

The scenes in Hiroshima in the aftermath were truly hellish. The Rev. Kiyoshi Tanimoto, pastor of the Hiroshima Methodist Church, told a correspondent from the *New Yorker* magazine how he tried to ferry some survivors over the river to hospital:

> He drove the boat on to the bank and urged them to get on board. They did not move and he realised that they were too weak to lift themselves. He reached down and took a woman by the hands, but her skin slipped off in huge, glove-like pieces. He was so sickened by this that he had to sit down for a moment. Then he got into the water and, though a small man, lifted several of the men and women, who were naked, into his boat. Their backs and breasts were clammy, and he remembered uneasily what the great burns he had seen during the day had been like: yellow at first, then red and swollen, with the skin sloughed off, and finally, in the evening, suppurated and smelly ... He had to keep repeating to himself, 'These are human beings.'

To those who argued that the enemy ought to have been warned about the destructive power of the atomic bombs, or even had one demonstrated in a desert or an atoll beforehand, General Marshall succinctly noted: 'It's no good warning him. If you warn them there's no surprise. And the only way to produce shock is surprise.' With only two bombs available, to risk wasting one to no effect was inconceivable. President Truman made a radio broadcast soon afterwards, explaining that the bomb had been atomic, and thus unlike anything that had ever been

seen before. 'That bomb had more power than 20,000 tons of T.N.T.' (that is, 20 kilotons), he told his listeners, which included the Japanese Government. 'It had more than two thousand times the blast power of the [22,000-pound deep-penetration] British "Grand Slam", which is the largest bomb ever used in the history of warfare. (It was long thought that Truman was accurate, and that the bomb dropped on Nagasaki was roughly the same size in terms of TNT, but in 1970 the British nuclear pioneer Lord Penney proved that Hiroshima's blast had in fact been about 12 kilotons, while the Nagasaki blast had been around 22 kilotons.)

George MacDonald Fraser's views on the morality of what had happened at Hiroshima echoed those of the vast majority of Britons and Americans at the time, both civilian and military. He pointed out that:

> We were of a generation to whom Coventry and the London Blitz and Clydebank and Liverpool and Plymouth were more than just names; our country had been hammered mercilessly from the sky, and so had Germany; we had seen the pictures of Belsen and of the frozen horror of the Russian Front; part of our higher education had been dedicated to techniques of killing and destruction; we were not going to lose sleep because the Japanese homeland had taken its turn. If anything, at the time, remembering the kind of war it had been, and the kind of people we, personally, had been up against, we probably felt that justice had been done. But it was of small importance when weighed against the glorious fact that the war was over at last.

Almost, but not quite. In fact the Japanese Government decided to fight on regardless, hoping that the Allies had only one such weapon and believing that the home islands could be successfully defended from invasion and the dishonour of occupation. So three days after Hiroshima the city of Nagasaki was similarly devastated by Fat Man, with 73,884 people killed, 74,909 injured and similarly debilitating long-term mental and physical effects on the population as at Hiroshima, owing to the radiation released. (It almost didn't happen; the B-29 pilot Major Charles 'Chuck' Sweeney nearly ran out of runway on Tinian with his 5-ton bomb on board, and a crash would have wiped out much of the island.)

Not knowing that the Americans had no more atomic bombs to drop, and shocked by Russia's intervention in the Pacific War on 8 August, which they were unable effectively to counter, the Japanese did finally surrender on 14 August, with the Emperor Hirohito admitting to his people in a broadcast at noon the next day that the war had gone 'not necessarily to Japan's advantage', especially in view of 'a new most cruel bomb'. Even as he prepared to broadcast, a group of young officers invaded the palace grounds in an attempted coup intended to prevent him from doing so.

A fortnight later, on Sunday, 2 September, six years and one day after Germany had invaded Poland, General Douglas MacArthur and Admirals Chester Nimitz and Sir Bruce Fraser and representatives of the other Allied nations took the formal Japanese surrender, which was signed by the one-legged Foreign Minister Mamoru Shigemitsu and the Army Chief of Staff General Yoshijiro Umezu, aboard the battleship USS *Missouri*, by then moored in Tokyo Bay. (She was chosen because she had served at Iwo Jima and Okinawa and was Nimitz's flagship; it was mere coincidence that she was named after President Truman's home state.) MacArthur concluded the ceremony by saying: 'Let us pray that peace be now restored to the world and that God will preserve it always. These proceedings are closed.'

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J. Robert Oppenheimer

Here is a review by Thomas Powers of four books on **J. Robert Oppenheimer** which appeared in *The New York Review of Books* (Vol. 52, number 14) of 22 September 2005.

An American Tragedy

By Thomas Powers

American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer
by Kai Bird and Martin J. Sherwin
Knopf, 721 pp., $35.00

The Ruin of J. Robert Oppenheimer and the Birth of the Modern Arms Race
by Priscilla J. McMillan
Viking, 373 pp., $25.95

Oppenheimer: Portrait of an Enigma
by Jeremy Bernstein
Ivan R. Dee, 223 pp., $25.00

J. Rober Oppenheimer and the American Century
by David C. Cassidy
Pi Press, 462 pp., $27.95

1.

One of the many complexities of the character of J. Robert Oppenheimer is apparent in his response to the discovery of nuclear fission in January 1939. "The U business is unbelievable," he wrote to a colleague once he had satisfied himself that uranium atoms really did split when bombarded with neutrons. "It is I think exciting, not in the rare way of positrons and mesotrons, but in a good honest practical way." He meant that fission didn't turn physics upside down and inside out like so many other discoveries of the first decades of the twentieth century. Fission was as practical as a hammer. The clincher for Oppenheimer was watching the dramatic green spikes on the oscilloscope of the Berkeley physicist Luis Alvarez when an atom split. "In less than fifteen minutes," Alvarez wrote later,

He not only agreed that the reaction was authentic but also speculated that in the process extra neutrons would boil off that could be used to split more uranium atoms and thereby generate power or make bombs. It was amazing to see how rapidly his mind worked....

The speed of Oppenheimer's mind would not have surprised those who knew him. At thirty-four Oppenheimer was famously brilliant. The surprise was his enthusiasm for the "good honest practical way" fission might be put to work. His whole life had been moving in an entirely different direction since his discovery of physics, and especially theoretical physics, at Harvard in the early 1920s, then at the Cavendish lab in Cambridge, England, and finally in the German university town of Göttingen, where he studied with Max Born, argued with his fellow students, and developed "some taste in physics."

For a decade theory dominated his life and later his teaching in California until the mid-1930s when Oppenheimer suddenly discovered politics— specifically, the "popular front" politics of

the American Communist Party as it tried to rally resistance to fascism. Oppenheimer's politics were, however —like his physics—mainly theoretical. He always insisted he never joined the Party himself, and the FBI, despite a dozen years of relentless surveillance and phone-tapping, never managed to prove he did.

Oppenheimer early in the war readily agreed with a US Army security officer, charged with weighing his loyalty, and said it seemed he had "belonged to nearly every fellow-traveling organization on the West Coast." He went to rallies, helped raise funds for refugees of the Spanish civil war, made substantial donations of his own to a representative of the Party, fell in love with one Communist, and was close to many others, including his brother Frank, who joined the Party in 1936 and remained until about 1942. For Oppenheimer in his Red period communism was a noble ideal, a way of conceiving a just world, and very likely—much in the way of his physics, his ambitious reading, his tailoring, his interest in art, food, wine, and martinis made exactly so—another means of distinguishing himself from the ordinary run of mankind.

Oppenheimer the theorist grasped immediately that fission could be used to build a bomb, and his interest went beyond the subatomic physics that would allow it to happen. Almost immediately some of Oppenheimer's students—Philip Morrison, Sydney Dancoff, the newly arrived Joseph Weinberg—went to work designing a bomb. The first version was drawn on a napkin in a student union restaurant. Within a week Morrison was startled on entering Oppenheimer's office to see on the blackboard a drawing of the bomb surrounded by equations. To his friend George Uhlenbeck, Oppenheimer wrote, "So I think it really not too improbable that a ten cm cube of uranium deuteride...might very well blow itself to hell." This remark can be interpreted as one of the very first attempts to estimate "critical mass"—the all-important quantity of fissionable material required for the runaway chain reaction of splitting atoms that gives the atomic bomb its power.

Oppenheimer not only directed his genius toward understanding how a bomb could be made to work, but then stuck with it for six years through the ordeals of dispelling official doubts that the former Red could be trusted; building and running a laboratory; getting the best people to drop what they were doing to join a secret project in New Mexico; designing, manufacturing, and testing an actual weapon; and finally coaching military officers on delivery of the bomb itself—instructing them on how high to detonate it, what sort of weather to seek or avoid, and what kind of target would make the most powerful impact on the collective mind of the rulers of Japan and hasten the end of the war.

That the bomb happened at all is remarkable. More astonishing still is the pace that was maintained. The starting bell was a conference on bomb physics held at Los Alamos in March 1943, and written up by Oppenheimer's former student Robert Serber in a tome referred to thereafter as "the primer." Twenty-eight months later, in July 1945, a test bomb was detonated in the desert at Alamogordo. No other bomb-making nation has matched this speed record, and some aspirants, like Iran, have been picking their slow way forward over a span of decades and haven't reached the testing stage yet.

The magnitude of Oppenheimer's role in this vast endeavor is fully recorded in Richard Rhodes's history, *The Making of the Atomic Bomb*, published twenty years ago. American wealth partly explains the success of the project but more important was American resolution—the driving determination to make it happen. The Manhattan Project, as it soon came to be called, was created in June 1942 and taken over in mid-September by Colonel Leslie Groves, who was given a general's star for shouldering the task. Groves was a true monster of

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resolution. The scientists resented and often made fun of him, and Richard Rhodes was no fan of the general, either, yet he looms over *The Making of the Atomic Bomb* like a force of nature.

Money, industrial infrastructure, technical knowhow, and General Groves were all important parts of the mix, but none of these contributed more to the pace of the success than Oppenheimer. He was always on stage—guiding, pushing, placating, reassuring, asking questions, making suggestions, stretching Army security regs to ensure that the scientists could all talk to each other. He even found an hour a week to listen to the torrent of complaint and bright ideas from the brilliant but touchy Edward Teller, who was already obsessed with the fusion weapon he called the "super."

The sheer effort of will of keeping the bomb on track through all hours and emotional weathers wasted Oppenheimer, always thin, down to a stalk at 115 pounds. Once or twice he was ready to snap and give up. His friend I.I. Rabi, the only physicist who answered with a principled "no" to Oppenheimer's call to work on the project, came out to New Mexico from time to time to buck him up. Rabi did not want to help build a bomb as "the culmination of three centuries of physics," but when the time approached to see if the gadget worked, and Oppenheimer was under greater strain than ever, Rabi was on hand to listen to the countdown and watch the dawn in an instant turn brighter than the full glare of day while many, staring awestruck through thick filters, wondered if the spreading ball of fire would stop before swallowing the world. As striking to Rabi was the sight of Oppenheimer himself after people were up and about again: "I'll never forget his walk; I'll never forget the way he stepped out of the car.... This kind of strut. He had done it."

But it is not what Oppenheimer did in the high desert of New Mexico between April 1943 and August 1945 that explains our enduring interest in Oppenheimer as a man, and the appearance now, sixty years later, of four new books in which he is the central figure. In Oppenheimer's extraordinary life the building of the atomic bomb is the middle chapter. The test that made Oppenheimer strut comes just past the midpoint in the nearly six-hundred-page biography jointly written by Kai Bird and Martin Sherwin, *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*. What followed the building of the bomb is what makes Oppenheimer one of the handful of genuinely tragic figures in American history.

When the dust of Hiroshima and Nagasaki had settled, the American military concluded that it had acquired the solution to practically everything —a club to cow the Russians and a cheap substitute for a big peacetime army. Oppenheimer's thinking took a different turn. Over the next decade his deepening sense of the dangers posed by the hothouse growth in the number of nuclear weapons so angered Air Force generals and some civilian officials that they conspired to destroy him. More than once Rabi warned Oppenheimer that powerful enemies were sharpening their knives. Oppenheimer's vulnerable spot would be his Red period. Rabi urged him to write something for a popular magazine like *The Saturday Evening Post*, confess all, and put it behind him. Perhaps Oppenheimer was overconfident; perhaps he feared exposing old friends to trouble from Red hunters like Senator Joseph McCarthy. In any event he ignored Rabi's warnings and in 1954 Oppenheimer's enemies, with the consent and assistance of the White House, brought him down.

How this was done, by whom, and why is the subject of Priscilla McMillan's account of the Atomic Energy Commission hearing in the spring of 1954 which probed, and eventually publicized, the recesses of Oppenheimer's political and emotional life and then stripped him of his security clearance for "substantial defects of character." McMillan's short, lucid, and intense book, *The Ruin of J. Robert Oppenheimer*, is a stunning complement to *American Prometheus*,

placing the scarifying final episode in Oppenheimer's life on a dissecting table in order to separate and identify, as if it were the nervous system of a rat, the filaments of ambition, rancor, and collusion of the three brooding men who cut Oppenheimer down. The man with the power to break him was Lewis Strauss, a vain and thin-skinned industrialist who became Oppenheimer's boss when President Eisenhower named him chairman of the AEC in 1953. The man who provided the argument and the occasion was William Liscum Borden, a single-minded young zealot who thought he knew why Oppenheimer resisted Air Force demands for hydrogen bombs —"more probably than not," Borden wrote the head of the FBI in November 1953, "J. Robert Oppenheimer is an agent of the Soviet Union."

But neither could have managed Oppenheimer's destruction without the help of the obsessed H-bomb promoter Edward Teller, who had never forgiven Oppenheimer for choosing another man to run the theoretical division at Los Alamos, who dreamed of replacing Oppenheimer as the protean man of the hour, and who nursed matters forward as he methodically planted seeds of suspicion in the minds of Borden, Strauss, and Air Force generals that Oppenheimer's "faulty judgment" could be traced to hidden loyalties from his Red period.

For those ready to devote a whole season to absorbing Oppenheimer entire, an excellent introduction can be found in another of the new books now appearing; Jeremy Bernstein's short profile, *Oppenheimer: Portrait of an Enigma*, will prepare the reader for the story in its long form. Bernstein was a student at the Institute for Advanced Study (IAS) in Princeton in the late 1950s when Oppenheimer was its director and took away a vivid impression of the man. A lively writer as well as a physicist, Bernstein has written many articles for *The New Yorker* and a number of books about scientists, and he not only understands but is actually interested in the physics that brought the bomb into the world. Indeed, his short book has the clearest feel for Oppenheimer's way of doing science; it goes beyond the names of problems and papers to explain in brisk fashion the questions he was thinking about, and how he made such a profound impression on the leading physicists of the period before the war.

Best are several telling anecdotes of Bernstein's encounters with Oppenheimer in the years closely following his public humiliation by the AEC. He notes, for example, that Oppenheimer always sat in the front row at Institute for Advanced Study physics seminars and often made sharp or biting comments about things said or questions asked. "If he made what he thought was a witty comment," Bernstein writes, "he would look around to make sure that we had all taken it in." Reading that we better understand the impulse behind Oppenheimer's question to Joseph Volpe, the AEC's lawyer, after a hearing in which Oppenheimer made cruel fun of Strauss for opposing export of American radioactive isotopes, a position Oppenheimer dismissed as silly: "My own rating of the importance of isotopes in this broad sense," he said, "is that they are far less important than electronic devices, but far more important than, let us say, vitamins, somewhere in between." "Well, Joe, how did I do?" Oppenheimer asked, expecting praise for the way he had skewered Strauss. "Too well, Robert," Volpe answered, "much too well." He had seen the look on Strauss's face, and so had two other AEC members, Gordon Dean and the chairman of the AEC, David Lilienthal. "I remember clearly the terrible look on Lewis' face," said Dean. Lilienthal called it "a look of hatred ...that you don't see very often in a man's face."

This gratuitous offense was given in June 1949, when Oppenheimer was still a national hero and probably had more influence on American atomic policy than any other single person. He was chairman of the AEC's General Advisory Committee (GAC) but his power was of the moral, not the bureaucratic, variety. Military officers, and especially the "big bomb" men of

the Air Force, egged on by Edward Teller, found him a formidable adversary. As early as March 1950, McMillan writes, Teller sought out Borden, then a staffer on Congress's Joint Committee on Atomic Energy (JCAE), to suggest that slow going on the hydrogen bomb was Oppenheimer's fault for discouraging younger men from working on the problem. A few months later Teller planted another seed with Borden. Oppenheimer, he said, had been quite a leftist in his day; his brother Frank never would have joined the Communist Party without Robert's approval; it was Robert who brought Frank to Los Alamos to work on the atomic bomb; and as chairman of the GAC, with a Q clearance that allowed him to know everything, Oppenheimer was well placed to be the most damaging spy in American history—that is, if he *were* a spy.

This speculation came only a few months after the confession of the Soviet spy Klaus Fuchs, prominent at Los Alamos and the man who kept the notes during an early conference on "the super"—the hydrogen bomb—in 1946. In the realm of malevolent insinuation Teller's sly suggestion ranks as a grandmaster chess opening, and it was more than Borden could handle. By November he was telling the chairman of the JCAE, "I conclude that we may well have another Fuchs still in the project today...."

But personal animosity alone does not explain the destruction of Oppenheimer. Just as important was the argument over building a hydrogen bomb. The decision rested with the president but the man with the most powerful public voice in arguing whether it was to be yes or no was Oppenheimer. On this question he was of two minds between the end of the war and the moment in October 1949 when the GAC, prompted by the discovery that Russia had successfully tested its own atomic bomb, had to take a stand. Central to Oppenheimer's thinking was the bomb itself—not just the practical difficulties of making it "better," but also the troubling implications of the huge increase in destructive power promised by fusion weapons, a thousand times greater than the fission bombs which had destroyed Hiroshima and Nagasaki.

The practical difficulties, always safer to stress than moral hesitations, were formidable. The inventive Teller had many ideas for using fission bombs to create the high temperatures required to ignite fusion but none of the ideas worked—a fact Teller blamed on three people: on Oppenheimer for discouraging the project; on Norris Bradbury, the new director of Los Alamos, for not giving the program a crash priority; and above all on the Polish mathematician Stanislaw Ulam, for demonstrating time and time again that Teller's math was wrong since the hydrogen would cool down too quickly for a working bomb. Never once, then or in the decades before his death in 2003, did Teller concede that while he was the one insisting the problem had to be solved, he did not know how to do it.

The years of intellectual combat that preceded a solution for the ignition problem are brilliantly told by McMillan, who explains the science, evokes the contrasting styles and gifts of Ulam and Teller, and brings fully to life the strangely distant time when men were learning how to unleash the energy of stars, but still had to do their calculations with slide rules and the primitive early computers that John von Neumann was building at the IAS in Princeton. One of Ulam's inspired discoveries was a kind of shorthand method for calculating the progress of an exploding bomb, a gimmick that saved months of laborious number-crunching by hand. From Teller's point of view the news from Ulam was always bad—rapid cooling, no ignition or no propagation of fusion throughout the hydrogen fuel, ever larger estimates of the amount of tritium needed to help trigger ignition. Tritium was expensive in the usual way of money, but in another way as well—every gram of it tied up production capacity that could have been used

to make about eighty grams of plutonium, the fissionable material principally used in fission bombs.

Teller's wartime design for the so-called "classical super" called for about four hundred grams of tritium; by 1947 he conceded that the requirement had doubled to eight hundred grams at a "cost" of sixty-four kilograms of plutonium, enough for perhaps between four and six fission bombs. The bad news did not halt there. In the fall of 1950 a new tritium estimate suggested a need for between three and five kilograms. Now the "cost" was four hundred kilograms of plutonium, getting on toward enough for fifty bombs. Teller's bright ideas never caught up with the ignition problem, but despite these repeated failures Oppenheimer and the GAC supported and funded research on fusion weapons, albeit without enthusiasm, arguing what seemed self-evident —a larger number of smaller bombs would provide a lot more military clout than a smaller number of larger bombs, which in any event were too big for any targets except the largest cities.

When the GAC with Oppenheimer as chairman met at the end of October 1949 to consider whether an all-out "crash" program for the H-bomb was a sensible response to the Russian success, Teller's difficulties offered a ready excuse for delay. But after two days of discussion, as McMillan describes in detail, the GAC raised a very different objection to H-bombs—they were immoral. Eight of the nine members of the GAC—Glen Seaborg was absent and could not participate—opposed a crash program, saying, "We all hope that by one means or another the development of these weapons can be avoided." More remarkably, all agreed that the power of hydrogen bombs made them essentially weapons of genocide. Two of the members, Enrico Fermi and I.I. Rabi, went still further in a separate opinion, putting into words conclusions their colleagues probably shared, at least in part, but were unwilling to state baldly. "It is clear that the use of such a weapon cannot be justified on any ethical ground," they wrote.

The fact that no limit exists to the destructiveness of this weapon makes its very existence and the knowledge of its construction a danger to humanity as a whole. It is necessarily an evil thing considered in any light.

Oppenheimer did not write this strong version of the case against the H-bomb, but Teller, Strauss, and the Air Force "big bomb" generals all assumed that it was his doing. They were not far from right. Since Hiroshima and Nagasaki Oppenheimer had changed. He soon developed second thoughts about the use of the bomb on Japan when it was already "essentially defeated," and he was disturbed and probably a little shocked by the cavalier way in which an early effort to halt the spread of the bomb—the "Acheson-Lilienthal plan," actually written by Oppenheimer with the help of the faithful Rabi—was handed over to a self-important financier, Bernard Baruch, by President Truman. Baruch reshaped the plan as a poisoned apple and the Russians predictably turned it down.

But Oppenheimer did not simply disagree with the drift of official policy; his moral qualms cut closer to the bone. There was no hiding from the horror of the destruction at Hiroshima and Nagasaki. Philip Morrison and Robert Serber had both been part of a survey team which had walked the ground, seen the victims, and returned to describe the devastation.

It should not seem odd that a weapon which killed a hundred thousand people in a day, most of them women and children, would raise troubling thoughts in the minds of the people who had worked flat out for two years to build it. When I first started to talk to Los Alamos scientists about the invention of nuclear weapons twenty years ago I assumed that they had long since confronted and sorted out the rights and wrongs of the case, but I soon found that it was-

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n't so. At an early date their thinking had frozen around a handful of simple ideas— building the bomb was justified because the Germans were trying to do it; using the bomb was justified because it ended the war and demonstrated to the world their terrible destructive power; building more and better bombs was justified because they served as a deterrent and made it more difficult to use them again. Perhaps this self-reassurance should not surprise us; it is hard to condemn something that you have irretrievably *done*.

But at the outset of the invention process the power of the new weapon was harder to ignore. Some scientists were appalled by the intention to destroy cities at a single blow, and a few, for varying reasons, felt compelled to break lockstep. At Los Alamos, the Harvard physicist Theodore Alvin Hall, the youngest person (at eighteen) admitted to the Tech Area where the real work was mainly done, and the German Klaus Fuchs, a member of the British contingent, both decided they had an obligation to pass on atomic secrets to the Russians—information which in fact allowed the Russians in 1949 to test a carbon copy of the American plutonium bomb. In both the United States and Britain intelligence authorities received information on several occasions during the war from sources in Germany claiming that a German bomb program existed but was opposed by scientists assigned to carry out the work. Sending these messages east and west was illegal— treason, in fact—but it was also clearly moral in its primal impulse.

Motives similar to those of the Germans drove a few of the American bomb-makers—Robert Wilson at Los Alamos; Leo Szilard, James Franck, and others at the Metallurgical Laboratory in Chicago—to step out of channels to argue that it was immoral to use the bomb on Japan without first staging a demonstration and giving Japan a chance to surrender. Their attempts to reach high officials infuriated General Groves and failed to halt progress toward Hiroshima. Other restive souls included Rabi, who had declined to work on the bomb in the first place; the Polish émigré Joseph Rotblat, trapped in London by the outbreak of the war, who joined the British bomb program for fear of the Germans but quit in late 1944 when he was told that the Germans had no program; and Oppenheimer himself, who did more than anyone else to ensure that the bomb was ready "in time," briefly exulted, and then gradually internalized the idea that the dead had been murdered by him.

Our evidence for Oppenheimer's feelings is thin—a handful of remarks mainly recorded by others. But from them we can conclude that something very like a wave of remorse seems to have hit Oppenheimer shortly after Nagasaki was destroyed by the second atomic bomb, a blow criticized by many of the bomb builders as gratuitous and unnecessary. Within weeks his strut was gone. Abruptly, he resigned his position, packed up, and departed Los Alamos. In a somber farewell speech in October he said that pride in building the bomb must be tempered with a profound concern. If atomic bombs are to be added as new weapons to the arsenals of a warring world ...then the time will come when mankind will curse the names of Los Alamos and Hiroshima.

Nine days later he was brought to see President Truman by Secretary of War Robert Patterson. "Mr. President," he said, "I feel I have blood on my hands." Truman was disgusted, described Oppenheimer later as a "cry-baby scientist," and told Dean Acheson, "I don't want to see that son-of-a-bitch in this office ever again." That was the last time Oppenheimer spoke so baldly of guilt, but he did not shed it. Three years later, in February 1948, *Time* magazine quoted him as saying, "In some sort of crude sense which no vulgarity, no humor, no overstatement can quite extinguish, the physicists have known sin; and this is a knowledge which they cannot lose." Oppenheimer often cloaked his point in a thicket of words, as he did here, but there is

no mistaking the meaning of the word "sin," and there is no hiding which physicist he had in mind.

It was this personal history of guilt and remorse that convinced Teller, Strauss, and the Air Force generals that the GAC's objections to the H-bomb as a weapon of genocide must have been ultimately Oppenheimer's doing. McMillan cites the many policy differences that separated Oppenheimer from Air Force generals, who wanted a free hand in building and planning to use atomic weapons. But still worse from the generals' point of view was any hint that destruction of cities from the air was immoral. That was how they had defeated Japan without an invasion. The GAC report threatened to raise questions that presidents and generals wanted to ignore. It is probable that no other official American document, on a subject of such consequence, was ever argued so lucidly and seriously on moral grounds; it is certain there has been none since. One reason is that the GAC report had no impact; at the end of January 1950, pressed by the Pentagon, his personal advisers, and the knowledge that the Russians had the bomb, President Truman announced that "I have directed the Atomic Energy Commission to continue its work on all forms of atomic weapons, including the so-called hydrogen or super bomb." But there is a second explanation for the absence of moral argument in official deliberations of weapons policy over the last half-century—the brutal example of the public destruction of the haunted scientist-statesman who had seemed to embody both the triumph and the guilt for Hiroshima.

2.

The life of Oppenheimer has long awaited its biographer. Writing the history of the invention of nuclear weapons began immediately after Hiroshima and in recent decades has culminated with a series of major books on the leading figures of the early atomic era. Among these works, each the result of years of exhaustive research and writing, are Rhodes's definitive history, already cited; William Lanouette's life of Leo Szilard, *Genius in the Shadows* (1992); James Hershberg's life of one of Oppenheimer's civilian bosses during the war, *James B. Conant: Harvard to Hiroshima and the Making of the Nuclear Age* (1993); Gregg Herken's *Brotherhood of the Bomb: The Tangled Lives and Loyalties of Robert Oppenheimer, Ernest Lawrence, and Edward Teller* (2002), a work containing much original research often cited by the books under review here; and Robert S. Norris's *Racing for the Bomb: General Leslie R. Groves, the Manhattan Project's Indispensable Man* (2003).

But Oppenheimer, the truly central figure, seemed to resist the attempt to write his life on the grand scale. An early effort, Peter Goodchild's *J. Robert Oppenheimer: Shatterer of Worlds* (1980), included many valuable personal details, and now David Cassidy brings us the best account of Oppenheimer's life in science with *J. Robert Oppenheimer and the American Century*. Cassidy is the author of a substantial biography of Werner Heisenberg, the German physicist who was at the heart of German nuclear research efforts during World War II. Having written the life of a scientist who did not build a bomb for his government, Cassidy has now written the life of a scientist who did.

The book's chief strength is the way it tracks Oppenheimer through the later years of the quantum revolution, explaining, among other things, how Oppenheimer managed to miss the big idea or discovery so many people believed was in him, by concentrating instead during his years in California on the loose ends left by other theorists. Cassidy also argues that Oppenheimer's destruction should be seen as a deliberate official effort to reassert a wartime degree

of control over nuclear issues. But Cassidy's grasp of Oppenheimer's character seems once removed, probably because few who knew him remain to be interviewed.

Martin Sherwin, author of one of the important early histories of the bomb, *A World Destroyed: Hiroshima and Its Legacies* (1975), got an earlier start, when most of the major figures were still around with memory intact. He began researching an Oppenheimer biography in 1979 and seemed an ideal candidate for the job. In an author's note Sherwin says he expected to deliver a manuscript to his publisher in four or five years. But twenty years after he began, no manuscript was in sight. Not everyone was surprised; historians of the subject, a small gossiping group, suggested that Sherwin was the latest victim of the curse of Oppenheimer, whose genius was tainted by a mean-spirited streak. Aspiring biographers, it was said, came to loathe the company of the man and dropped their projects. A history of Sherwin's progress can be found in the list of interviews, more than a hundred in all, included in the bibliography of *American Prometheus* —he maintained a vigorous pace for the first couple of years, but then fell off in the early 1980s. In 1985 Sherwin stopped completely.

What agonies filled the intervening years go unmentioned in Sherwin's author's note, but about five years ago he was joined in the project by Kai Bird, distinguished author of lives of important cold war figures—John McCloy, intimately involved in the early history of atomic bombs as an assistant to Secretary of War Henry Stimson; and the Bundy brothers, William and McGeorge. The latter had helped Stimson write his own explanation of why a bomb was dropped on Hiroshima. So Bird arrived with a feel for the war years and well steeped in the early history of the bomb.

But even so the challenge was great —too long a time with a difficult subject can sap a writer of interest and enthusiasm; writing from another man's notes can be dry and perfunctory; collaboration can be an awkward literary arrangement, bridging disagreements with bland language. But somehow in this case all difficulties have been overcome; *American Prometheus* is clear in its purpose, deeply felt, persuasively argued, disciplined in form, and written with a sustained literary power. It is still recognizably Sherwin's book, giving new emphasis to arguments first made in *A World Destroyed*, but at the same time Bird has brought freshness and clarity along with some interpretive ideas of his own.

But it is Oppenheimer the man, not general ideas about the nuclear age, that dominates these pages. Oppenheimer emerges in all his complexity —a brainy theorist but also an "underdogger," quick in his sympathy for those at the bottom of the social ladder; a sometime revolutionary who irritated former students like Philip Morrison with his talk after the war about "Dean" and "George"—Dean Acheson and George Marshall; devoted defender of his alcoholic wife Kitty but blind to her ego-crushing treatment of their son, Peter; lifelong friend of students like Serber, and betrayer of students like Rossi Lomanitz, Joseph Weinberg, and Bernard Peters, whom he simply threw to the Red-hunting wolves.

In this list, which might be long extended, no contradictions are more important than those involving the bomb itself, not just the first bombs built at Los Alamos but all the bombs that followed in the next eight years. No bomb builder expressed remorse in stronger words—"sin," "blood on my hands"—but at the same time Oppenheimer stopped short of regretting what he had done. "It isn't that I don't feel bad," he told reporters in Tokyo in 1960. "It is that I don't feel worse tonight than I did last night." This is like barbed wire stretched to the snapping point.

Oppenheimer's feelings about the hydrogen bomb were central to the security charges brought against him by the Atomic Energy Commission in 1954. The AEC indictment was for the most part a repetition of "derogatory information" originally considered during the war, and then restudied in 1947 before Oppenheimer's security clearance was confirmed—with one exception. The AEC now charged "that you were instrumental in persuading other outstanding scientists not to work on the hydrogen bomb project." Unwilling to call him a spy, the commission nevertheless insisted that there was something untrustworthy in his reluctance to add the H-bomb to the American arsenal. During the hearing the AEC's chief inquisitor, Roger Robb, picked at the core of Oppenheimer's opposition as if it were a scab:

Robb: You mean you had a moral revulsion against the production of such a dreadful weapon?

Oppenheimer: This is too strong...

Robb: Which is too strong, the weapon or my expression?

Oppenheimer: Your expression. I had a grave concern and anxiety.

Robb: You had moral qualms about it, is that accurate?

Oppenheimer: Let us leave the word "moral" out of it.

Robb: You had qualms about it.

Oppenheimer: How could one not have qualms about it? I know no one who doesn't have qualms about it.

It was Rabi who felt most keenly that the destruction of Oppenheimer was a gratuitous act resulting in a tragic loss—not just personally for Oppenheimer, but for the country. "I never hid my opinion from Mr. Strauss that I thought this whole proceeding...should not have been done," Rabi testified during the hearing.

There he was...a consultant, and if you don't want to consult the guy, you don't consult him, period.... It didn't seem to me the sort of thing that called for this kind of proceeding at all against a man who had accomplished what Dr. Oppenheimer has accomplished. There is a real positive record, the way I expressed it to a friend of mine. We have an A-bomb and a whole series of *it*....

In the published transcript asterisks follow representing material deleted for security reasons—a list of the many kinds of improved atomic weapons, including the hydrogen bomb, which were developed under Oppenheimer's leadership as chairman of the GAC. Rabi concluded, "What more do you want, mermaids?"

The point is a sound one. Why did Lewis Strauss use his position as chairman of the AEC to destroy Oppenheimer, why did Edward Teller encourage him to do it, why did the Air Force insist it had to be done, and why did President Eisenhower not only permit Strauss to do it but help him? The answers to these questions—the detailed answers, providing not just plausible surmise, but chapter and verse—form the body of Priscilla McMillan's extraordinary book, *The Ruin of J. Robert Oppenheimer*.

The reader will get the drift immediately if the word "ruin" is understood to be an active verb—in the sense meant when someone says "I will ruin you." What destroyed Oppenheimer was the month-long AEC hearing, the stripping of his security clearance only one day before it would have lapsed, and the publication of the 993-page hearing transcript with its merciless exposure of so many details of Oppenheimer's life—adulteries, lies to government officials, connections to Communists, betrayals of friends. But as Ward Evans argued in his dissent to the board's ruling, every one of these charges had been weighed and dismissed during the war

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and again in 1947. When the AEC confirmed the cancellation of Oppenheimer's clearance in June 1954, they took an entirely new tack, ignored the board's previous findings, and dropped all mention of his "opposition" to the H-bomb, which in any event had not stopped him from overseeing its development and successful first test. Instead they cited "substantial defects of character."

The AEC's conclusion invites us to read the fate of Oppenheimer as a tragedy of the classic, Aristotelian sort—the fall of a great man caused by flaws in his character. But as McMillan shows in her vivid and relentless account of his "ruin," it was not Oppenheimer's flaws, or even the anti-Red hysteria of the time, that destroyed him—it was the power and the determination of his enemies. This is not the prevailing view of what happened, and Americans are famously unwilling to think ill of their national leaders. But McMillan makes a detailed and convincing case that Oppenheimer's destruction was the result of Teller's insinuations, the string-pulling of Strauss, and Borden's willingness to attack at another's bidding.

McMillan is a gifted researcher and interviewer, shrewd and patient. Her best-known previous book, published nearly thirty years ago, was *Marina and Lee*, which in my opinion remains the strongest single account of the tortured life that drove Lee Harvey Oswald to murder President Kennedy. In *Ruin* she illuminates all the old half-hidden corners of the final act in Oppenheimer's life—how Strauss recruited journalists and fed them distorted stories about the H-bomb program to build public feeling against Oppenheimer; how Stanislaw Ulam actually found the way to ignite fusion in the H-bomb; how Strauss falsified accounts of his role in prompting the administration to erect a "blank wall" between Oppenheimer and the nation's secrets while Borden's sensational charges were investigated; how the Eisenhower administration authorized FBI eavesdropping on Oppenheimer's conversations with his lawyers so that AEC inquisitors would always know what he feared or planned; how the AEC's chief lawyer in the hearing, Roger Robb, lied about his access to hundreds of FBI wiretap transcripts, claiming falsely that he had never asked for or seen them.

But most relentless of all is McMillan's account of Edward Teller, who may be said to have spent the last half of his life concealing, reinterpreting, and making slyly irrelevant apologies for what he did to Oppenheimer. Teller's performance, something like Nixon's in what remained of his life after Watergate, was just good enough to let him appear in distinguished company without fear of turned backs and refused handshakes. But no longer; the true Teller is stripped by McMillan for those who care to see.

The biggest lie in a life with many was Teller's posturing as "the father of the H-bomb," supported by the never quite explicit claim that he was the one who had solved the fusion ignition problem that allowed the H-bomb to work. What he did instead was to conceal the role of the man who really did it—Stanislaw Ulam, who began to think in December 1950 of a "bomb in a box." The compression of thermonuclear material would help it to burn, he reasoned. The following month Ulam told his wife, who had been hoping that thermonuclear weapons could never be made to work. Next he told the physicist Carson Mark, busy at the time with pending nuclear tests in the Pacific, and then Norris Bradbury, who saw the point right away.

Finally Ulam described his idea to Teller, who told his colleagues in the Theoretical Division, "Ulam has had an idea, but he hasn't got it quite right." It was not shock waves from an exploding fission bomb that would best create the necessary compression, but the radiation itself, getting there first before the shock waves began to blow the assembly apart. "Radiation implo-

sion" was Teller's part of the new idea. But Ulam's contribution went a step further by introducing the notion of "staging" the explosion—using a fission "primary" to compress both fusion fuel and a fission "secondary." All three ideas were central to the first working thermonuclear device; two were Ulam's, but Teller systematically squeezed him out of the history of the new idea, which was formally written up by a Teller protégé, Frederic de Hoffman.

Usually such inventions were patented; in this case Teller refused to sign the application because Ulam would have to sign, too. As a result, no patent was issued at all. In the mid-1950s Teller published a brief account of the invention of the H-bomb, *The Work of Many Men*, in which Ulam was identified only as one of the early pessimists. In his 1962 book, *Legacy of Hiroshima*, Teller claimed the big idea was his doing with the help of de Hoffman. "Ulam invented nothing!" he often insisted, but of course the bomb designers all knew the truth, and many considered Teller the lowest, most contemptible kind of offender in the world of science, a stealer of credit. What only a few knew then is visible to all now, and there is something bracing in watching a slippery character brought to account.

At that point, in mid-1951, Oppenheimer dropped his arguments against the H-bomb—the Ulam-Teller ideas were too "technically sweet" to ignore, he said, but that did not still the animosities encouraged by Teller in Strauss and the Air Force. At every stage of this story McMillan enriches our understanding of Teller's character and his role in promoting the creation of a second laboratory in Livermore, California; in tempting the United States to ever greater reliance on nuclear weapons for "defense"; and in placing a dark construction on whatever Oppenheimer said and did. Teller's plotting brought a moment of climax during the AEC hearing intended to end Oppenheimer's public influence once and for all. Of the forty witnesses called to testify only eight could be described as "prosecution" witnesses. Of the eight only one was a leading scientist, only one had been intimately involved in the programs directly overseen by Oppenheimer as chairman of the GAC, and only one was prepared to testify on the record that Oppenheimer could not be trusted—Edward Teller.

In later years Teller tried to explain his betrayal as a last-minute thing, triggered by Robb's account the day before his appearance of an elaborate story fabricated by Oppenheimer about an espionage attempt—the so-called "Haakon Chevalier affair," in which Oppenheimer took the initiative in giving security officials the name of George Eltenton, a chemist who wanted to put him in touch with Soviet officials; but for several months he withheld the name of the friend, Haakon Chevalier, whom Eltenton had approached in hopes of getting Oppenheimer's cooperation. Like all the other "derogatory information" in security files, the record of his evasions had been known to the AEC when it confirmed Oppenheimer's clearance in 1947; nothing new had been learned in the five years since. Teller claimed that he was so shocked by Oppenheimer's lie he determined to go farther than he had planned in his testimony the next day. That night old friends tried to dissuade him but he would not be moved.

The next day Robb put the big question to Teller in unmistakable form: "Do you or do you not believe that Dr. Oppenheimer is a security risk?" Teller answered:

In a great number of cases I have seen Dr. Oppenheimer act in a way which for me was exceedingly hard to understand. I thoroughly disagreed with him in numerous issues and his actions frankly appeared to me confused and complicated. To this extent I feel that I would like to see the vital interests of the country in hands which I understand better and therefore trust more.

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That was enough. Nothing else ever said about Oppenheimer did him greater injury.

Teller tried to claim all of the credit for the H-bomb, when only a third belonged to him of right, and he spent the rest of his life trying to undermine the idea that he deserved any of the credit for stripping Oppenheimer of his security clearance. McMillan does not choose to give a number to the percentage of his just share. In this instance the credit must necessarily be shared widely, since so many people across the whole spectrum of official Washington, along with numerous disgruntled bomb builders, did what they could to bring Oppenheimer down. But at its heart the principle behind the strategy was simple—poisoning trust—and for that Teller must take a deep and sweeping bow.

McMillan writes for the most part with quiet lucidity, letting each act or utterance speak for itself, but from time to time there shoots up from her prose something like a tongue of flame. Teller's success in promoting competing laboratories of bomb designers brings one such judgment. "Together," she writes, "Livermore and Los Alamos created the vast arsenal of superfluous nuclear weaponry that curses us today." Who does not sense that curse? She is tempted again when describing what Teller did to the men who aroused his ire—Oppenheimer, who wouldn't put him in charge of theoretical work at Los Alamos; Norris Bradbury, the Los Alamos director who balked at Teller's bullying behavior early in the H-bomb program; and Ulam, who came up with the brilliant insight that had eluded Teller. "The Freudian observer," McMillan writes, "might say that...Teller symbolically destroyed each of the three men who had dealt him a severe narcissistic blow. The layperson might conclude, more simply, that he sought to destroy the three men who had stood in his way." Judgments don't come any plainer than that.

It is rare that two important books on the same subject are published in the same year, rarer still that together they tell us so much about American politics, history, science, truth, life, and fate. Together *American Prometheus* and *The Ruin of J. Robert Oppenheimer* bring to a close a half-century's effort in writing the history of the atomic bomb. On this subject there will of course always be more to say, but the basic story is complete; if you want to know what happened it is there to read in these two books. One is a life of Oppenheimer on the grand scale for the first time. The other reveals at last how he was betrayed and destroyed. The present reviewer is tempted to say, I will not choose between these two books; honor them both.

Oppenheimer's friend Rabi said the stripping of his clearance killed him, but in fact he survived his humiliation by a dozen years and rarely complained. Some observers wearied of that attitude. After hearing Oppenheimer lecture at Harvard in 1957 the writer Edmund Wilson noted in his diary, "His humility now seemed to me hangdog." That doesn't sound right, and I suspect it was a different undercurrent of emotion that Wilson picked up—not apology, but a reluctance to blame others for what he had done.

What Oppenheimer left us at the end of the day was not the bomb— somebody would have built it—but his life. I mean the whole of it—the brilliance, the rich and complex personality, the example of his greatest achievement, pushed through in the furious, triumphant American way; and then the long harrowing aftermath so apparent in his late photographs—a man distressed by what the world insisted on doing with what he had built, and convinced there would be a price to pay. Foreboding of this kind was banished at a very early date from the Pentagon, the White House, and the bomb laboratories. There the ruling faith is that professionals can manage the dangers, and for a decade after the collapse of the Soviet Union and the end of the

cold war, it was possible to think they were right. But now things have changed again, and we find we are living once more with the old suspense, threatened by the weapons we were the first to build and use, and waiting for nothing to happen forever.

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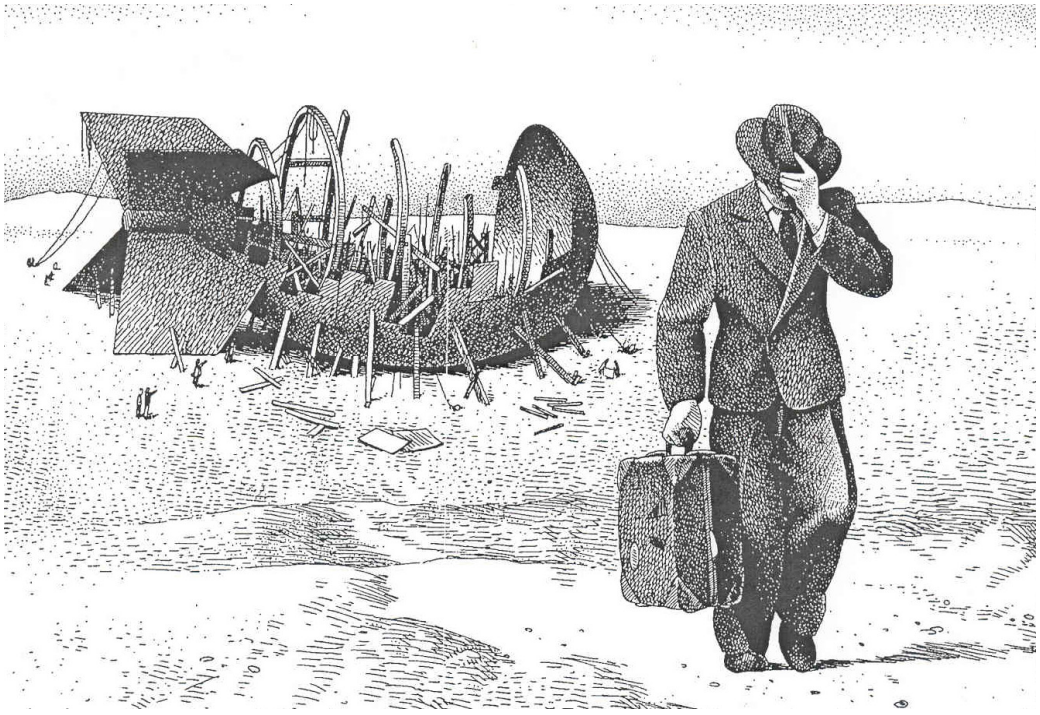

Leaving the bomb project

A nuclear physicist responsible for helping design the atomic bomb tells for the first time why he decided to leave Los Alamos in 1944.

by Joseph Rotblat*

WORKING ONTHE Manhattan Project was a traumatic experience. It is not often given to one to participate in the birth of a new era. For some the effect has endured throughout their lives; I am one of those.

This essay is not an autobiography; it describes only my involvement in the genesis of the atomic bomb. AIl extraneous personal elements are left out, but their exclusion does not mean that they are unimportant. Our hopes and fears, our resolutions and actions, are influenced by an infinite number of small events interacting with each other all the time. Because of this, each of us may react differently to the same ser of conditions. The experience of every Los Alamite is unique.

AT THE BEGINNING of 1939; when the news reached me of the discovery of fission, I was working in the Radiological Laboratory in Warsaw. Its director was Ludwik Wertenstein, a pupil of Marie Curie and a pioneer in the science of radioactivity in Poland. Our source of radiation consisted of 30 milligrams of radium in solution; every few days we pumped the accumulated radon into a tube filled with beryllium powder. With this minute neutron source we

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managed to carry out much research, even competing with Enrico Fermi's prestigious team, then in Rome, in the discovery of radionuclides. Our main achievement was the direct evidence of the inelastic scattering of neutrons; my doctoral thesis was on that subject.

In the earlier experiments on inelastic scattering we used gold as the scatterer. By the end of 1938 I had begun to experiment with uranium, so when I heard of the fission of uranium, it did not take me long to set up an experiment to see whether neutrons are emitted at fission. I soon found that they are — indeed, that more neutrons are emitted than produce fission. From this discovery it was a fairly simple intellectual exercise to envisage a divergent chain reaction with a vast release of energy. The logical sequel was that if this energy were released in a very short time it would result in an explosion of unprecedented power. Many scientists in other countries, doing this type of research, went through a similar thought process, although not necessarily evoking the same reaction.

In my case, my first reflex was to put the whole thing out of my mind, like a person trying to ignore the first symptom of a fatal disease in the hope that it will go away. But the fear gnaws all the same, and my real was that someone would put the idea into practice. The thought that I myself would do it did not cross my mind, because it was completely alien to me. I was brought up on humanitarian principles. At that time my life was centered on doing "pure" research work, but I always believed that science should be used in the service of mankind. The notion of utilizing my knowledge to produce an awesome weapon of destruction was abhorrent to me.

In my gnawing fear, the "someone" who might put it into practice was precisely defined: German scientists. I had no doubt that the Nazis would not hesitate to use any device, however inhumane, if it gave their doctrine world domination. If so, should one look into the problem to find out whether the fear had a realistic basis? Wrestling with this question was agonizing, and I was therefore glad that another pressing matter gave me an excuse to put it aside.

This other matter was my move to England, where I was to spend year with Professor James Chadwick in Liverpool, on a grant to work on the cyclotron which was then being completed there. This was my first trip abroad, and the upheaval kept me busy both before the journey 'in April 1939 and for some time afterward, because I spoke very little English, and it took me a long time to settle down.

Throughout the spring and summer the gnawing went on relentlessly. It intensified with the increasing signs that Germany was getting ready for war. And it became acute when I read an article by S. Flügge in *Naturwissenschaften* mentioning the possibility of nuclear explosives.

Gradually I worked out a rationale for doing research on the feasibility of the bomb. I convinced myself that the only way to stop the Germans from using it against us would be if we too had the bomb and threatened to retaliate. My scenario never envisaged that we should use it, not even against the Germans. We needed the bomb for the sole purpose of making sure that it would not be used by them: the same argument that is now being used by proponents of the deterrence doctrine.

With the wisdom of hindsight, I can see the folly of the deterrent thesis, quite apart from a few other flaws in my rationalization. For one thing, it would not have worked with a psychopath like Hitler. If he had had the bomb, it is very likely that his last order from the bunker in Berlin would have been to destroy London, even if this were to bring terrible retribution to Germany. Indeed, he would have seen this as a heroic way of going clown, in a Gotterdammerung.

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My thinking at the time required that the feasibility of the atom bomb be established, one way or the other, with the utmost urgency. Yet I could not overcome my scruples. I felt the need to talk it over with someone, but my English was too halting to discuss such a sensitive issue with my colleagues in Liverpool.

In August 1939, having gone to Poland on a personal matter, I took the opportunity to visit Wertenstein and put my dilemma before him. The idea of a nuclear weapon had not occurred to him, but when I showed him my rough calculations he could not find anything scientifically wrong with them. On the moral issue, however, he was unwilling to advise me. He himself would never engage in this type of work, but he would not try to influence me. It had to be left to my own conscience.

The war broke out two days after I returned to Liverpool. Within a few weeks Poland was overrun. The stories that Hitler's military strength was all bluff, that his tanks were painted cardboard, turned out to be wishful thinking. The might of Germany stood revealed, and the whole of our civilization was in mortal peril. My scruples were finally overcome.

BY NOVEMBER 1939 my English was good enough for me to give a course of lectures on nuclear physics to the Honors School at Liverpool University, but by then the department's senior research staff had disappeared: chef had gone to work on radar and other war projects. I had, therefore, to approach Chadwick directly with an outline of my plan for research on the feasibility of the atom bomb. His response was typically Chadwickian: he just grunted, without letting on whether he had already thought of such a plan. Later I learned that other scientists in the United Kingdom did have the same idea, some of them with similar motivation.

A few days later Chadwick told me to go ahead and gave me two young assistants. One of them presented a problem. He was a Quaker and as such had refused to do war work. He was therefore sent to Liverpool University for academic duties — but was diverted to work with me on the atom bomb! I was not allowed to reveal to him the nature of our research, and l had qualms of conscience about using him in such an unethical way.

The main idea which I put to Chadwick was that for the atom bomb the chain reaction would have to be propagated by fast neutrons; otherwise it would not differ much from a chemical explosive. It was therefore important to measure the fission cross-section for fast neutrons, the energy distribution of fission neutrons, their inelastic scattering, and the proportion of those captured without producing fission. It was also relevant to find out whether spray neutrons might cause a premature start of the reaction, which meant determining the probability of spontaneous fission of uranium.

We built up a small team of young but devoted physicists and used the cyclotron to tackIe some of these problems. Later we were joined by Otto Frisch who measured the fast neutron fission cross-section for uranium-235. I had the idea of using plutonium, but we had no means of making it.

As a result of these investigations, we were able to establish that the atom bomb was feasible from the scientific point of view. However, it also became clear that in order to make the bomb a vast technological effort would be required, far exceeding the manpower and industrial potential of wartime Britain. A top-level decision was reached to collaborate with the Americans. And so I found myself eventually in that "wondrous strange" place, Los Alamos.

IN MARCH 1944 I experienced a disagreeable shock. At that time I was living with the Chadwicks in their house on the Mesa, before moving later to the "Big House;' the quarters for single scientists. General Leslie Groves, when visiting Los Alamos, frequently came to the

Chadwicks for dinner and relaxed palaver. During one such conversation Groves said that, of course, the real purpose in making the bomb was to subdue the Soviets. (Whatever his exact words, his real meaning was clear.) Although I had no illusions about the Stalin regime — after alI, it was his pact with Hitler that enabled the latter to invade Poland — I felt deeply the sense of betrayal of an ally. Remember, this was said at a time when thousands of Russians were dying every day on the Eastern Front, tying clown the Germans and giving the Allies time to prepare for the landing on the continent of Europe. Until then I had thought that out work was to prevent a Nazi victory, and now I was told that the weapon we were preparing was in tended for use against the people who were making extreme sacrifices for that very aim.

My concern about the purpose of our work gained sub stance from conversations with Niels Bohr. He used to come to my room at eight in the morning to listen to the BBC news bulletin. Like myself, he could not stand the U.S. bulletins which urged us every few seconds to purchase a certain laxative! I owned a special radio on which I could receive the BBC World Service. Sometimes Bohr stayed on and talked to me about the social and political implications of the discovery of nuclear energy and of his worry about the dire consequences of a nuclear arms race between East and West which he foresaw.

AII this, and the growing evidence that the war in Europe would be over before the bomb project was completed, made my participation in it pointless. If it took the Americans such a long time, then my fear of the Germans being first was groundless.

When it became evident, toward the end of 1944, that the Germans had abandoned their bomb project, the whole purpose of my being in Los Alamos ceased to be, and I asked for permission to leave and return to Britain.

WHY DID OTHER scientists not make the same decision? Obviously, one would not expect General Groves to wind up the project as soon as Germany was defeated, but there were many scientists for whom the German factor was the main motivation. Why did they not quit when this factor ceased to be?

I was not allowed to discuss this issue with anybody alter I declared my intention to leave Los Alamos, but earlier conversations, as well as much later ones, elicited several reasons.

The most frequent reason given was pure and simple scientific curiosity — the strong urge to find out whether the theoretical calculations and predictions would come true. These scientists felt that only after the test at Alamogordo should they enter into the debate about the use of the bomb.

Others were prepared to put the matter off even longer, persuaded by the argument that many American lives would be saved if the bomb brought a rapid end to the war with Japan. Only when peace was restored would they take a hand in efforts to ensure that the bomb would not be used again.

Still others, while agreeing that the project should have been stopped when the German factor ceased to operate, were not willing to take an individual stand because they feared it would adversely affect their future career.

The groups I have just described — scientists with a social conscience — were a minority in the scientific community. The majority were not bothered by moral scruples; they were quite content to leave it to others to decide how their work would be used. Much the same situation exists now in many countries in relation to work on military projects. But it is the morality issue at a time of war that perplexes and worries me most

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Recently I carne across a document released under the Freedom of Information Act. It is a letter, dated May 25, 1943, from Robert Oppenheimer to Enrico Fermi, on the military use of radio active materials, specifically, the poisoning of food with radioactive strontium. The Smyth Report mentions such use as a possible German threat, but Oppenheimer apparently thought the idea worthy of consideration, and asked Fermi whether he could produce the strontium without letting too many people into the secret He went on: "I think we should not attempt a plan unless we can poison food sufficient to kill a hall a million men" I am sure that in peacetime these same scientists would have viewed such a plan as barbaric; they would not have contemplated it even for a moment. Yet during the war it was considered quite seriously and, I presume, abandoned only because it was technically infeasible.

AFTER I TOLD Chadwick that I wished to leave the project, he carne back to me with very disturbing news. When he conveyed my wish to the intelligence chief at Los Alamos, he was shown a thick dossier on me with highly incriminating evidence. It boiled clown to my being a spy: I had arranged with a contact in Santa Fe to return to England, and then to be flown to and parachuted anta the part of Poland held by the Soviets, in order to give them the secrets of the atom bomb. The trouble was that within this load of rubbish was a grain of truth. I did indeed meet and converse with a person during my trips to Santa Fe. It was for a purely altruistic purpose, nothing to do with the project, and I had Chadwick's permission for the visits.

Nevertheless, it contravened a security regulation, and it made me vulnerable. Fortunately for me, in their zeal the vigilant agents had included in their reports details of conversations with dates, which were quite easy to refute and to expose as complete fabrications. The chief of intelligence was rather embarrassed by all this and conceded that the dossier was worthless. Nevertheless, he insisted that l not talk to anybody about my reason for leaving the project. We agreed with Chadwick that the ostensible reason would be a purely personal one: that I was worried about my wife whom I had left in Poland.

And so, on Christmas Eve 1944, I sailed for the United Kingdom, but not without another incident. Before leaving Los Alamos I packed all my documents — research notes as well as correspondence and other records — in a box made for me by my assistant. En route I stayed for a few days with the Chadwicks in Washington. Chadwick personally helped me to put the box on the train to New York. But when I arrived there a few hours later, the box was missing. Nor, despite valiant efforts, was it ever recovered.

THE WORK ON THE Manhattan Project, as I said at the outset, has had an enduring effect on my life. Indeed, it radically changed my scientific career and the carrying out of my obligations to society. Work on the atom bomb convinced me that even pure research soon finds applications of one kind or another. If so, I wanted to decide myself how my work should be applied. I chose an aspect of nuclear physics which would definitely be beneficial to humanity: the applications to medicine. Thus I completely changed the direction of my research and spent the rest of my academic career working in a medical college and hospital.

While this gave me personal satisfaction, I was increasingly concerned about the political aspects of the development of nuclear weapons, particularly the hydrogen bomb, about which I knew from Los Alamos. Therefore, I devoted myself both to arousing the scientific community to the danger, and to educating the general public on these issues. I was instrumental in setting up the Atomic Scientists Association in the United Kingdom, and within its framework organized the Atom Train, a travelling exhibition which explained to the public the good and evil aspects of nuclear energy. Through these activities I came to collaborate with Bertrand Russell. This association led to the Foundation of the Pugwash Conferences, where I met

again with colleagues from the Manhattan Project, who were also concerned about the threat to mankind that has arisen partly from their work.

After 40 years one question keeps nagging me: have we learned enough not to repeat the mistakes we made then? I am not sure even about myself. Not being an absolute pacifist, I cannot guarantee that I would not behave in the same way, should a similar situation arise. Our concepts of morality seem to get thrown overboard once military action starts. It is, therefore, most important not to allow such a situation to develop. Our prime effort must concentrate on the prevention of nuclear war, because in such a war not only morality but the whole fabric of civilization would disappear. Eventually, however, we must aim at eliminating all kinds of war.

Tom Herzberg, United States

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A.Q. Khan and the Oath Not Taken

Dan Dubno
The Huffington Post, 17 February 2009

He is old, angry, and suffers from thrombosis and prostate cancer. Yet this sick old man, who trained as a metallurgical engineer, is often described as the most dangerous person on Earth. Father of the "Islamic Bomb," Dr. Abdul Qadeer Khan is a wildly popular figure at home in Pakistan. No less than fifteen academic institutions have been named in his honor there. Several days ago, throngs of adoring fans erupted in joy as Pakistan's High Court declared Khan "a free man" ending his five-year house arrest.

For more than fifteen years, Khan and his international team of scientists and engineers eluded (and at times colluded with) various intelligence agencies in a successful effort to create and detonate Pakistan's atomic bomb. Estimates are that Pakistan now has dozens of nuclear weapons and Khan is portrayed as the savior of his nation against the threat of nuclear blackmail from neighboring India.

Yet, for most of the world, Dr. Khan is regarded as a reckless and egotistical scientist who widely disseminated nuclear secrets and sold highly restricted equipment. His simple motive: greed. Five years ago, under pressure from Pakistan's former President General Pervez Musharraf, Khan confessed he ran an illicit worldwide nuclear export network. This massive operation trafficked and traded nuclear materials, gas centrifuges, and critical bomb-making blueprints to countries that included North Korea, Libya, and Iran.

After the public confession, Musharraf immediately pardoned this "national hero," prohibited him from being questioned, and isolated him under unofficial house-arrest. This frustrated international investigators who sought to unravel how much of the nuclear genie Khan set loose around the world and why several of his key associates had met with Al Qaeda leaders.

Have the Pakistani courts freed the most dangerous man on Earth? At the moment, Dr. Khan is still held closely under guard. His network of agents and collaborators appear to be more carefully monitored now. Might they resume trading in global Armageddon? Possibly. But Dr. Khan remains dangerous. His release and "rehabilitation" trumpets a tragic message to the world that gross scientific misconduct has no adverse consequences. He is lionized at home when logic and justice demand retribution for his reckless proliferation. His irresponsibility endangers all mankind and he remains unrepentant.

When asked just days ago what the international community would think of his release, Khan was unapologetic:

"Are they happy with our God? Are they happy with our prophet? Are they happy with our leader? Never," he said. "I don't care about rest of the world. I care about my country."

Well, I care about the rest of the world. Most scientists and engineers care about it too. The problem is that the relationship between scientists and the world has completely changed. When the 20th century began, scientists and engineers could cause society a modest amount of mischief and harm. Today, the work of a few determined rogue scientists could destroy a significant portion of our world. The release of nuclear, biological, or chemical weapons or the dissemination of radioactive "dirty dust" are probabilities civilization must now actively prepare for.

Significant threats no longer require massive state-sponsorship. With rapid advances in biotechnology and with greater dissemination of weapons research and technology, the ability for unethical scientists to manufacture weapons of mass destruction (WMD) has increased exponentially in the past few years and will continue for the foreseeable future.

Intelligence communities, of course, struggle to identify threats as these scientific capabilities continue to grow. But these agencies have limited scientific resources (especially lacking personnel with sufficient training and specialized knowledge of emerging threats.) They have largely focused their efforts on prominent "rogue" governments and terror organizations. So far, they have had mixed results identifying such threats: (i.e.,: failing to assess the status of chemical and biological weapons in Iraq; failing to discover nuclear weapons research in Syria; failing for years to comprehend the former Soviet Union's enormous biological weapons capabilities, etc.)

Equally troubling is how these intelligence agencies have, in large part, been unsuccessful in early detection of "independent" threats: (i.e., timely tracking of Khan's nuclear network; failing to anticipate the release of nerve gas on Tokyo subways; the lengthy and fumbled investigation into the anthrax attack that shut-down Senate office buildings.)

As destructive technology becomes simpler to develop and deploy, scientists must join the frontlines in the battle to protect the public from those whose intention is to abuse science and cause great harm.

Medical doctors take a Hippocratic Oath: First, Do No Harm. Physicians (and even their patients) understand that those who intentionally cause harm practicing medicine must be sanctioned and punished. Engineering and scientific societies also have established varying codes of ethical standards. In sharp contrast to medical standards, engineers and scientists are first introduced to ethical codes of conduct (if at all) only after reaching post-graduate study. This is too little and way too late.

It is astonishing that clear codes of ethics are not widely subscribed to by scientists. Even where there are ethical codes, no enforcement mechanisms exist to make these meaningful. While scientists with terrorist aspirations are unlikely to be deterred by codes of conduct (no matter how well-defined), having standards widely inculcated in the broad scientific community is likely to deter those on the periphery of such work. Such standards will encourage scientists and engineers with suspicions about unsavory behavior to help uncover potential threats.

Would a code of ethics deter A.Q. Khan? Of course not. But imagine a world in which scientists know they have ethical strictures to abide by. Imagine that even the children of scientists and their neighbors know that great responsibility comes with the territory. It would have been far more difficult for A.Q. Khan's network to have flourished for more than fifteen years, largely avoiding significant scrutiny, if all of his associates, suppliers, and collaborators existed in an ethos where scientific responsibility was clearly understood... and where breaking ethical codes had consequences.

In 1999, Sir Joseph Rotblat, physicist and Nobel laureate, realized that the advances in science required the adoption of codes of responsibility. He wrote,

"Through its technological applications, science has become a dominant element in our lives. It has enormously improved the quality of life. It has also created great perils, threatening the

very existence of the human species. Scientists can no longer claim that their work has nothing to do with the welfare of the individual or with state policies."

Rotblat suggested that scientists adopt an oath something like this:

"I promise to work for a better world, where science and technology are used in socially responsible ways. I will not use my education for any purpose intended to harm human beings or the environment."

Throughout my career, I will consider the ethical implications of my work before I take action. While the demands placed upon me may be great, I sign this declaration because I recognize that individual responsibility is the first step on the path to peace."

I decided, after years of producing war coverage and reporting on technology and proliferation issues, that I would help scientists become more involved in preventing the spread of WMD s. Tracing the arc of Dr. Khan's sociopathic nuclear enterprise should make it clear to all scientists and engineers that ethical standards are required on the job. These codes of ethics must be spelled out and must be made enforceable. Scientists should have a means of anonymously reporting suspicious and unethical behavior especially regarding the development of WMDs. Journalists, scientists, and investigators should work together to assess such threats. (See The Hourglass Initiative: http://www.hourglassinitiative.org/ .)

In December 2008, an astonishing study, "World at Risk: The Report of the Commission on the Prevention of Weapons of Mass Destruction Proliferation and Terrorism," chaired by Bob Graham and Jim Talent was released. It detailed "where the risks to the United States are increasing: the crossroads of terrorism and proliferation in the poorly governed parts of Pakistan" and potential methods of preventing biological and nuclear terrorism. Regarding the increasing threat, they quoted Former Secretary of the Navy Richard Danzig who said, "Only a thin wall of terrorist ignorance and inexperience now protects us."

That thin wall gets thinner by the day as scientists without ethics, like Dr. A.Q. Khan and his henchmen, push the boundaries of technology with disregard of their ethical responsibility and the consequences for all of us. The world indeed is at risk and scientists can be the cause or the cure.

Code of Ethics (2003)

CODE OF ETHICS OF THE ARGENTINE PHYSICAL SOCIETY

General Considerations

Physicists, members and not members of the Argentine Physical Society (AFA) are part of the scientific community and, as such share responsibility in the task of modernizing society from their performance as researchers. These responsibilities take place at different levels: institutional as well as individual. Within this framework, the most elemental concept of ethics refers to:

1) Accepting those responsibilities while carrying on their functions as researchers and in the management of the resources for scientific research.

2) Acknowledging the existence of possible conflicts of interest while in charge of these tasks.

As in any human endeavor, intellectual honesty is an essential element in the physicist's work as well as in the relationship with each other and their environment. Intellectual dishonesty seriously jeopardizes the advancement of science and rarefies the interaction between scientists. The existence of dishonest individuals, whether overt or covert, at any instance of scientific work, compromises these activities as a whole, and as such must be disowned by the community.

At the same time, a physicist must be aware of his/her responsibility regarding the applications and uses of any acquired knowledge. The Argentine Physical Society suggests a voluntary pledge of an ethical nature at all university campuses and scientific institutions across the country.

It is responsibility of the AFA to advise its members about observing elemental ethics rules. The same posture has been taken by other physical societies who have already implemented their own codes of ethics.

The AFA considers that at least the following guidelines ought to be possible in our midst:

a) Regarding individuals

a.1) Any kind of dishonesty in the pursuing of research, constitutes behavior unbecoming to a physicist.

Examples of dishonest behavior are:

- plagiarism and the falsifying of results
- automatic co-authorship in publications where no collaboration took place
- multiple mailings of identical work or with small variations
- delay and/or appropriation of results when judging work from other researchers

a.2) Conscious participation in the development, improvement and fabrication of weapons of indiscriminate destruction such as nuclear, chemical and biological weapons, among others, is considered a breach of the basic ethical principles.

b) Regarding evaluations

b.1) Participation of physicists in evaluating committees of other physicists and of research projects must be considered a necessary activity and as such it must be carried out with absolute responsibility. It is imperative that the existence of possible conflicts of interest that might alter the results of the evaluation be expressed beforehand. Friendship or animosity, whether explicit or implicit, the proximity of the evaluating individual with the project under consideration, as well as neglecting to mention background knowledge, impair the evaluating process and seriously damage the progress of the discipline.

b.2) The use of information gained under the process of evaluation for personal benefit on the part of the members of the evaluating committee, is a form of obvious dishonesty.

b.3) To betray confidentiality of the evaluating process, by divulging the instances of the evaluation prior to the final resolution, jeopardizes the trust and transparency of the evaluating process.

c) Regarding institutional management

c.1) Using the position of science administrator, whether paid or ad-honorem, for his/her own benefit or the benefit of other groups related to the circumstantial post of the administrator, is an extremely serious breach of ethics on the part of a physicist.

c.2) Ignoring evaluating principles for the benefit or damage of individuals or research groups should be rejected since it establishes arbitrariness and constitutes corruption.

Implementation

To put into effect these rules of ethics we recommend:

- To give wide publicity to these rules of ethics among the members of the physics community.
- That AFA commits itself to the observance of these rules on the part of its members as a pre-requisite of their belonging to the association.
- That AFA take steps to have these principles adopted by all advisory committees belonging to CONICET and to all committees in the area of science and technology.
- To constitute an ad-hoc committee, (for instance made up of three indisputable physicists) every time that a violation of the rules takes place. This course of action, (analyzing every case by an ad-hoc committee) is more adequate than having a permanent committee.

We are grateful to Norma Badino for the translation of the Code and to Pierre Canonne for a critical reading of the manuscript.

NUCLEAR WEAPONS

Here you will find:

1. An article on fissile materials used in nuclear weapons.
2. Global nuclear stockpiles, 1945–2002 (with chart of stockpiles by year).
3. Graph of nuclear forces deployed in 1995
4. Graph on plutonium.
5. An article on nuclear arsenals in February of 2011

1. Fissile Materials in Nuclear Weapons

Frank Barnaby[6]

Which fissile materials used in civil nuclear programmes are usable to fabricate nuclear weapons? This question is of considerable importance to those anxious to prevent the spread of nuclear weapons. So far as nuclear proliferation is concerned, the important fissile isotopes are uranium-235 (U-235) and plutonium-239 (Pu-239). A sphere of pure U-235 would have a critical mass (the minimum amount required to sustain a fission chain reaction) of 15 kilogrammes. With uranium enriched to 40 per cent U-235, the critical mass increases to 75 kilogrammes; with 20 per cent U-235, it is 250 kilogrammes. In practice, therefore, high concentrations of U-235 are needed for the manufacture of nuclear weapons. Apart from the highly-enriched uranium used to fuel some research reactors, civil enriched uranium is of no military significance. Nuclear-power reactor fuel, for example, is enriched to less than 10 per cent. Civil plutonium, however, is an entirely different matter. The plutonium produced in civil nuclear-power reactors could be used in nuclear weapons. This is why a fissile material cut-off must include civil plutonium if it is to be effective.

The isotopic composition of various types of plutonium

There are various grades of plutonium, having different isotopic compositions according to the way in which the plutonium is produced. Plutonium produced in commercial nuclear-power reactors operated for the most economical production of electricity is called reactor-grade plutonium. Plutonium produced in military plutonium-production reactors, specifically for use in nuclear weapons, is called weapons-grade plutonium. Reactor-grade plutonium can be used to fabricate nuclear weapons, as proved when the Americans exploded such a weapon in 1962. Nuclear-weapon designers, however, prefer weapons-grade plutonium because it is a great deal easier to control. This has a higher percentage of the isotope plutonium-239 (Pu-239) than reactor-grade plutonium.

The isotopic composition of the three grades of plutonium are roughly as follows.

Reactor-grade[7]	*Weapons-grade*	*Breeder-blanket Pu*
1.4 per cent Pu-238	0.05 per cent Pu-238	—
56.5 per cent Pu-239	93.0 per cent Pu-239	96 per cent Pu-239
23.4 per cent Pu-240	6.4 per cent Pu-240	4 per cent Pu-240
13.9 per cent Pu-241	0.5 per cent Pu-241	—
and 4.8 per cent Pu-242	0.05 per cent Pu-242	—

Critical masses of plutonium

[6] Oxford Research Group, *Current Decisions Report*, No. 14, August 1994, pp. 83-84.

[7] As produced in thermal-reactor fuel elements exposed to about 33,000 megawatt-days per tonne of uranium fuel.

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The critical mass of plutonium is the minimum mass which can sustain a nuclear fission chain reaction. A nuclear weapon contains just less than the critical mass in the form of a sphere or shell. To explode the nuclear weapon the mass of plutonium is uniformly compressed, by exploding conventional high explosives placed around it, so that it becomes greater than critical (supercritical). At the instant of maximum super-criticality, neutrons are fired into the plutonium from a neutron 'gun', to initiate the fission chain reaction. At this instant, the density of the plutonium is roughly doubled and the plutonium is liquefied.

Critical masses of plutonium metal (kilogrammes)

	Reactor-grade	*Weapons-grade*	*Plutonium from breeders*
Alpha-phase[8]	13	11	10
Delta-phase	20	17	16

In nuclear weapons, plutonium metal in the delta-phase is normally used.

Plutonium oxide varies in density from 11.5 grammes per cubic centimetre in the crystal from to 2.3 grammes per cubic centimetre for uncompacted powder. For the former the critical mass of a spherical volume is about 35' kilogrammes; for the latter it is about 875 kilogrammes.

Whereas plutonium-239 undergoes fission when it captures a neutron, plutonium-240 undergoes fission spontaneously; it does not need an extra neutron. This means that in plutonium containing plutonium-240 there is a flux of neutrons from spontaneous fission. For breeder-blanket plutonium, this is 40 neutrons per second per gramme; for weapons-grade plutonium, it is 66 neutrons per second per gramme; and for reactor-grade plutonium, it is 360 neutrons per second per gramme.[9] The higher the number of spontaneous-fission neutrons the greater the probability that the weapon will pre-detonate and explode with an unpredictable explosive yield. However, this can be compensated for by using faster implosion to compress a subcritical mass to a supercritical mass. The faster the implosion the more predictable the yield of the nuclear explosion. Another difference is the amount of heat generated by the absorption of alpha particles: breeder-blanket plutonium generates about 1.7 watts per kilogramme; weapons-grade plutonium generates about 2.5 watts per kilogramme; and reactor-grade plutonium generates about 11 watts per kilogramme.

In a nuclear weapon, the plutonium sphere or shell is normally surrounded by a shell of beryllium which reflects neutrons that escape from the plutonium when it undergoes fission back into the plutonium. This reduces the amount of plutonium needed in the weapon to produce a supercritical mass. The beryllium shell is surrounded in turn by a shell of uranium, or some other heavy material, which acts as a tamper. The inertia of the tamper helps hold together the plutonium during the nuclear explosion to prevent the premature fragmentation of the fissioning material and thereby obtain a higher explosive yield. The uranium tamper is surrounded by conventional high explosive charges. When they are detonated a symmetrical shock wave converges on the plutonium and compresses it into a supercritical mass.

[8] In alpha-phase the density is 19.0 grammes per cubic centimetre, and in delta-phase the density is 15.8 grammes per cubic centimetre.

[9] Carson, M.J., *Reactor-Grade Plutoniums Explosive Properties,* Nuclear Control Institute, Washington D. C., August 1990.

If an effective neutron reflector and tamper are used, a good weapon designer could construct an efficient nuclear weapon with about 3 kilogrammes of breeder-blanket plutonium. Japan's Monju reactor, which started operating in April 1994, should, for example, produce about 70 kilogrammes of plutonium a year in its blanket, enough to produce around twenty nuclear weapons a year.

2. Global nuclear stockpiles, 1945–2002

The five major nuclear powers currently have more than 20,000 nuclear warheads in their arsenals, as shown in the table below. But this does not include a number of intact Russian nuclear warheads of indeterminate status—possibly as many as 10,000. Of the more than 30,000 intact warheads belonging to the world's eight nuclear weapon states, the vast majority (96 percent) are in U.S. or Russian stockpiles. About 17,500 of these warheads are considered operational. The rest are in reserve or retired and awaiting dismantlement.

We estimate that since 1945, more than 128,000 nuclear warheads have been built worldwide—all but 2 percent of them by the United States (55 percent) and the Soviet Union or Russia (43 percent). Since the Cold War ended, more and more warheads in U.S. and Russian stockpiles are being moved from operational status into various reserve, inactive, or contingency categories. The destruction of warheads is not required under current arms control agreements. For example, the 2002 Moscow Treaty (the Strategic Offensive Reductions Treaty) contains no verification provisions and completely ignores non-operational and non-strategic warheads. The result is that stockpiles are more opaque and more difficult to describe with precision.

The **United States** has produced some 70,000 warheads since 1945, of which, 60,000 have been dismantled (more than 12,000 of them since 1990). The U.S. arsenal contains approximately 10,600 intact warheads. Of this number, nearly 8,000 are considered active or operational. In addition, several hundred warheads await disassembly at the Pantex Plant near Amarillo, Texas, including the W56 and W79 warheads, around 36 B53 bombs, and some excess non-strategic B61 bombs. These warheads should have been dismantled by 2000, but for various reasons, the schedule has been extended.

As detailed in the Bush administration's Nuclear Posture Review (NPR), the plan is to reduce the number of "operationally deployed strategic warheads" to 1,700– 2,200 by the end of 2012. With the possible exception of the Minuteman III W62, there will be no further dismantlement of warheads beyond those specified in the 1994 NPR. The reduction of operationally deployed warheads will be accomplished by transferring warheads from active delivery vehicles to either a "responsive force" or to "inactive reserve." An example of inactive reserve warheads are those that do not have limited life components, such as tritium. Any additional disassembly before 2014, according to the Energy Department's National Nuclear Security Administration, would compete with planned refurbishments of the nine warhead types in the enduring stockpile. If current plans are fulfilled, by 2012 we estimate that the United States will have approximately 10,000 intact warheads—essentially the same number as today.

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Russia has not released information about the size of its stockpile. We estimate that since 1949 the Soviet Union/Russia has produced about 55,000 nuclear warheads, and that about 30,000 warheads existed in 1990–1991. The U.S. Defense Department and CIA estimate that Russia dismantled slightly more than 1,000 warheads per year during the 1990s, so that its remaining stockpile of intact warheads may be around 18,600. Only around 8,600 of these are thought to be operational. As many as 10,000 nuclear warheads are believed to be in non-operational status: in reserve for possible redeployment or retired and awaiting dismantlement.

The Moscow Treaty limits Russia's operationally deployed strategic warheads to no more than 2,200 by 2012, but because of limited resources and funding, it is unlikely that Russia will be able to sustain that many. Russia had pressed for a limit of 1,500 warheads, and if significant numbers of warheads are not refurbished and returned to operational forces, the stockpile could shrink to as few as 1,000 strategic warheads and no more than 1,000 tactical warheads over the next 10 years.

Britain is estimated to have produced approximately 1,200 warheads since 1953. Its current stockpile is thought to consist of some 200 strategic and "sub-strategic" warheads on Vanguard-class nuclear-powered ballistic missile submarines (SSBNs). The government declared in July 1998 that there would "be fewer than 200 operationally available warheads," of which 48 warheads would be on patrol at any given time on a single SSBN. The British arsenal peaked in the 1970s at 350 warheads.

France maintains approximately 350 warheads, down from 540 in 1992. France has produced more than 1,260 nuclear warheads since 1964. It has dismantled its land-based ballistic missiles and retired its nuclear bombs for delivery by naval-strike aircraft. The M51 sea-launched ballistic missile scheduled for deployment in 2010 was initially slated to carry an entirely new warhead (the TNO, or *tête nucléaire océanique),* but will instead be equipped with a more robust version of an existing design (probably the TN-75).

China is estimated to have an arsenal of around 400 nuclear warheads, down from 435 in 1993. China is thought to have produced some 600 nuclear warheads since 1964, and U.S. intelligence and defense agencies predict that over the next 15 years China may increase the number of warheads on primarily U.S-targeted missiles from 20 to between 75–100.

India and **Pakistan,** the world's two newest declared nuclear powers, have fewer than 100 nuclear warheads between them, most of which are not yet operationally deployed. We estimate that India has produced enough fissile material for 45–95 nuclear warheads but may have assembled only 30–35, and that Pakistan has produced fissile material sufficient for 30–52 weapons and assembled 24–48 warheads. Both countries are thought to be increasing their stockpiles.

Israel has neither confirmed nor denied possession of nuclear weapons, although U.S. intelligence reports for many years have labeled Israel a de facto nuclear power. Some unofficial reports estimate Israel's arsenal to have as many as 200 warheads, the first of which reportedly was assembled in 1967.

Nuclear Notebook is prepared by Robert S. Norris of the Natural Resources Defense Council and Hans M. Kristensen of the Nautilus Institute. Inquiries should be directed to NRDC, 1200 New York Avenue, N.W., Suite 400, Washington, D.C., 20005; 202-289-6868.

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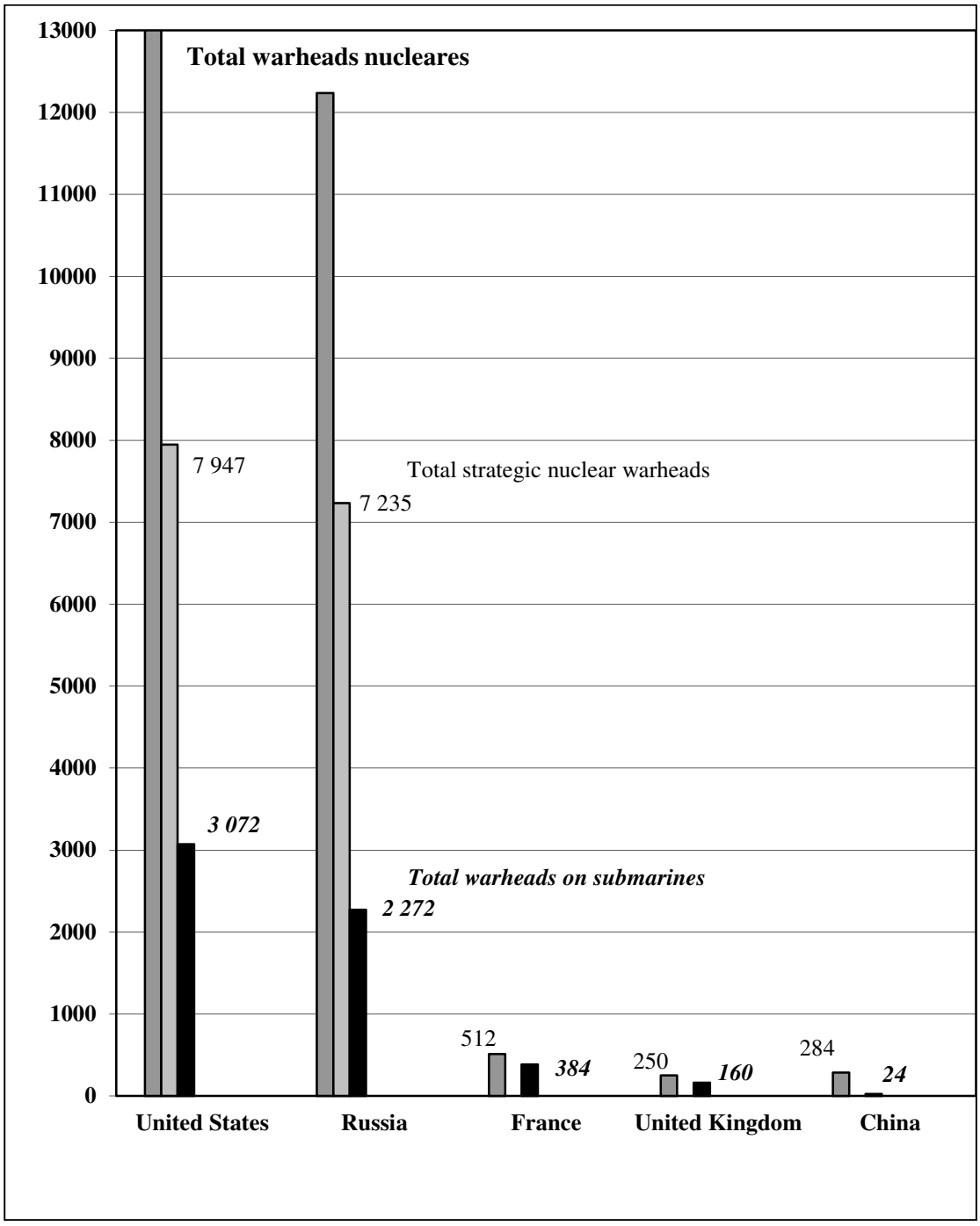
Year	U. S.	Russia	U. K.	France	China	Total
1945	6					6
1946	11					11
1947	32					32
1948	110					110
1949	235	1				236
1950	369	5				374
1951	640	25				665
1952	1,005	50				1,055
1953	1,436	120	1			1,557
1954	2,063	150	5			2,218
1955	3,057	200	10			3,267
1956	4,618	426	15			5,059
1957	6,444	660	20			7,124
1958	9,822	869	22			10,713
1959	15,468	1,060	25			16,553
1960	20,434	1,605	30			22,069
1961	24,111	2,471	50			26,632
1962	27,297	3,322	205			30,824
1963	29,249	4,238	280			33,767
1964	30,751	5,221	310	4	1	36,287
1965	31,642	6,129	310	32	5	38,118
1966	31,700	7,089	270	36	20	39,115
1967	30,893	8,339	270	36	25	39,563
1968	28,884	9,399	280	36	35	38,634
1969	26,910	10,538	308	36	50	37,842
1970	26,119	11,643	280	36	75	38,153
1971	26,365	13,092	220	45	100	39,822
1972	27,296	14,478	220	70	130	42,194
1973	28,335	15,915	275	116	150	44,791
1974	28,170	17,385	325	145	170	46,195
1975	27,052	19,055	350	188	185	46,830
1976	25,956	21,205	350	212	190	47,913
1977	25,099	23,044	350	228	200	48,920

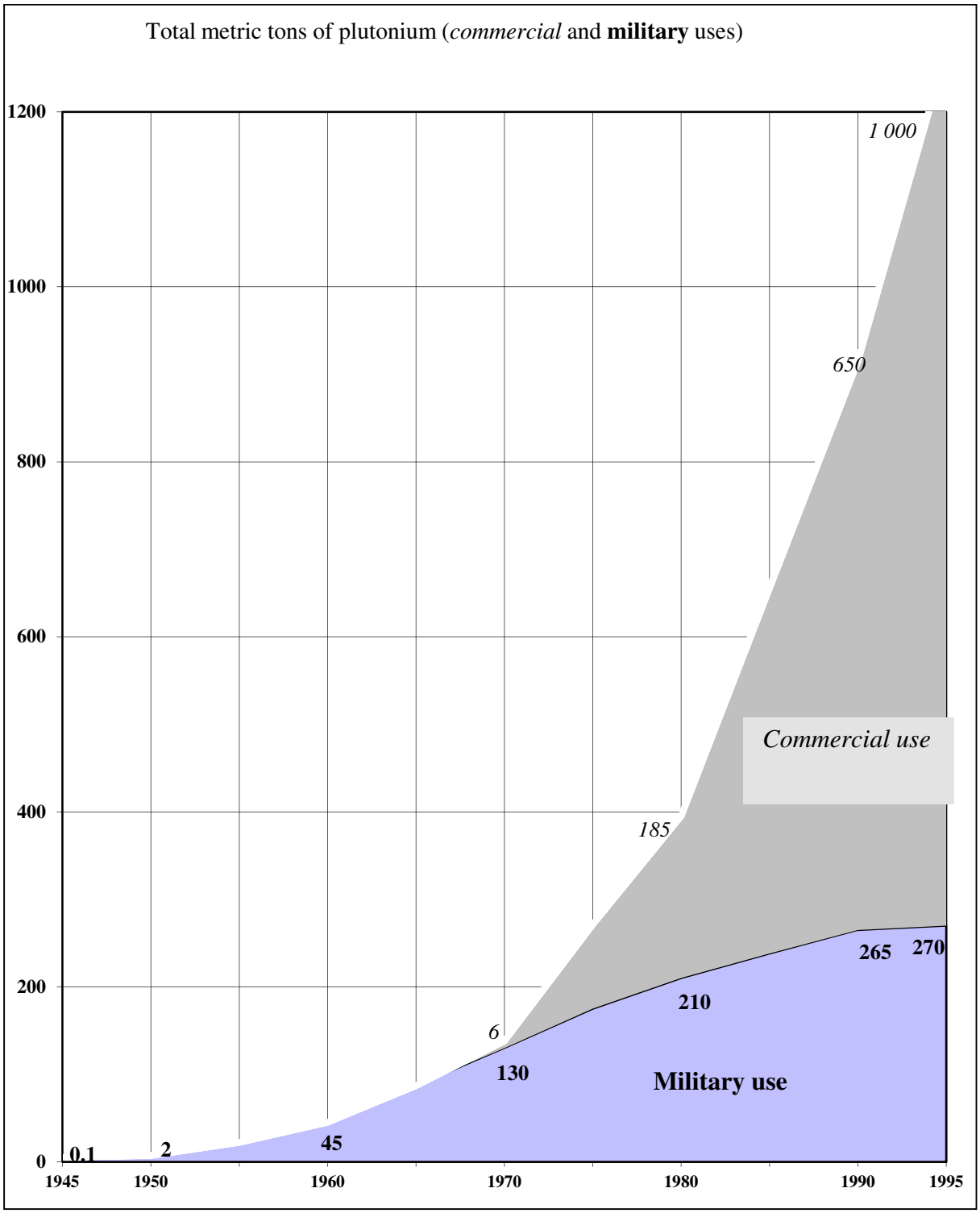
Year	U. S.	Russia	U. K.	France	China	Total
1978	24,243	25,393	350	235	220	50,441
1979	24,107	27,935	350	235	235	52,862
1980	23,764	30,062	350	250	280	54,706
1981	23,031	32,049	350	274	330	56,034
1982	22,937	33,952	335	274	360	57,858
1983	23,154	35,804	320	279	380	59,937
1984	23,228	37,431	270	280	415	61,624
1985	23,135	39,197	300	360	425	63,417
1986	23,254	40,723	300	355	425	65,057
1987	23,490	38,859	300	420	415	63,484
1988	23,077	37,333	300	410	430	61,550
1989	22,174	35,805	300	410	435	59,124
1990	21,211	33,417	300	505	430	55,863
1991	18,306	28,595	300	540	435	48,176
1992	13,731	25,155	300	540	435	40,161
1993	11,536	22,101	300	525	435	34,897
1994	11,012	18,399	250	510	400	30,571
1995	10,953	14,978	300	500	400	27,131
1996	10,886	12,085	300	450	400	24,121
1997	10,829	11,264	260	450	400	23,203
1998	10,763	10,764	260	450	400	22,637
1999	10,698	10,451	185	450	400	22,184
2000	10,615	10,201	185	470	400	21,871
2001	10,491	9,126	200	350	400	20,567
2002	10,600	8,600	200	350	400	20,150

3. Nuclear forces deployed in 1995



Fuente: British American Security Information Council, *Nuclear Futures: The Role of Nuclear Weapons in Security Policy*, (*Basic Research Report 96.I*), London and Washington, 1996, p. 10. Some totals are estimates. Warheads of so-called nuclear "threshold" countries are not included.

4. Plutonium.



Source: This graph appears in *Energy and Security* (number 1, 1996), Institute for Energy and Environment Research, Washington, p. 5. It is based on data in Arjun Makhijani and Scott Saleska, *The Nuclear Power Deception*, Takoma Park, Maryland: Institute for Energy and Research, 1996.

5. Status of World Nuclear Forces

Federation of American Scientists

More than a decade and a half after the Cold War ended, the world's combined stockpile of nuclear warheads remain at a very high level: more than 22,000. Of these, nearly 4,500 warheads are considered operational, of which nearly 2,000 U.S. and Russian warheads are on high alert, ready for use on short notice.

The exact number of nuclear weapons in each country's possession is a closely held national secret. Despite this limitation, however, publicly available information and occasional leaks make it possible to make best estimates about the size and composition of the national nuclear weapon stockpiles:

Status of World Nuclear Forces 2011*

Country	Operational Strategic	Operational Nonstrategic	Reserve	Military Stockpile	Total Inventory
Russia	1,900[a]	0[b]	6,100[c]	8,000	11,000[d]
United States	1,950	200[e]	2,850[f]	5,000	8,500[g]
France	290	n.a.	?[h]	~300	~300[h]
China	0[i]	?[i]	~180	240	240[i]
United Kingdom	160[j]	n.a.	65	225	225[j]
Israel	0	n.a.	80	80	80[k]
Pakistan	0	n.a.	90-110	90-110	90-110[l]
India	0	n.a.	80-100	80-100	80-100[m]
North Korea	0	n.a.	<10	<10	<10[n]
Total:	**~4,300**	**~200**	**~9,465**	**14,035**	**~22,600**

* All numbers are estimates and further described in the Nuclear Notebook in the *Bulletin of the Atomic Scientists*, and the nuclear appendix in the SIPRI Yearbook. Additional reports are published on the FAS Strategic Security Blog. Unlike those publications, this table is updated continuously as new information becomes available. Current update: **February 19, 2011**.

[a] Russian ballistic missile are thought to carry a full warhead load. An stimated 300 of the 1,900 operational warheads are for bombers and stored at the bases. Another 550 bomber weapons previously counted as operational are thought to be in central storage.
[b] Russia's estimated total inventory of 5,390 nonstrategic warheads, down from 15,000 in 1991, is declared to be in central storage.
[c] Includes an estimated 710 strategic (mainly bomber weapons) and 5,390 nonstrategic warheads.
[d] In addition to the 8,000 in the military stockpile, 3,000 retired warheads are estimated to be awaiting dismantlement. Russia is thought to dismantle approximately 1,000 retired warheads per year.
[e] Some 150-200 B61 bombs are deployed in Europe at six bases in five countries (Belgiium, Germany, Italy, Netherlands and Turkey).
[f] Non-deployed reserve includes an estimated 2,290 strategic and 560 non-strategic warheads in central storage.Some 260 nonstrategic warheads for the Tomahawk land-attack cruise missile (TLAM/N) are being retired.
[g] In addition to the 5,000 warheads in the military stockpile, approximately 3,500 retired warheads are awaiting dismantlement. In addition, nearly 14,000 plutonium cores (pits) and some 5,000 Canned Assemblies (secondaries) are in storage.
[h] France has stated that it has no reserve, but it probably has a small inventory of spare warheads.
[i] Chinese warheads are not thought to be operational but in storage. Many "strategic" warheads are for regional use. The status of a Chinese non-strategic nuclear arsenal is uncertain. Additional warheads are in storage from retirement or new production, for a total stockpile of approximately 240 warheads.
[j] Only 50 missiles are left, for a maximum of 150 warheads. “Less than 160” warheads are said to be "operationally available," but only one submarine with “up to 48 warheads” is on patrol at any given time. The number of "operational missiles" on each sub will be reduced to "no more than eight" with 40 warheads in the next few years.By the mid-2020s, the stockpile will be reduced to "not more than 180."
[k] Although Israel has produced enough plutonium for 100-200 warheads, the number of delivery platforms and estimates made by the U.S. intelligence community suggest that the stockpile might include approximately 80 warheads.
[l] The U.S. intelligence community estimates that Pakistan has produced 90-110 warheads. None of these are thought to be deployed but kept in central storage, most in the southern parts of the country. More warheads are in production.
[m] Indian nuclear warheads are not deployed but in central storage. More warheads are in production.
[n] Despite two North Korean nuclear tests, there is no publicly available evidence that North Korea has operationalized its nuclear weapons capability. A 2009 world survey by the U.S. Air Force National Air and Space Intelligence Center (NASIC) does not credit any of North Korea's ballistic missiles with nuclear capability.

[o] Numbers may not add up due to rounding and uncertainty about the operational status of the four lesser nuclear weapons states and the uncertainty about the size of the total inventories of three of the five initial nuclear powers.

The information available for each country varies greatly, ranging from the most transparent nuclear weapons state (United States) to the most opaque (North Korea). Accordingly, while the estiate for the United States is based on real numbers, the estimates for several of the other nuclear weapon states are highly uncertain.

This text is from the **Effects of the Possible Use of Nuclear Weapons and the Security and Economic Implications for States of the Acquisition and Further Development of these Weapons** *(United Nations, 1968), a study carried out, at the request of the General Assembly, by a group of experts appointed in 1966 by the Secretary-General of the United Nations.*

I. EFFECTS OF THE POSSIBLE USE OF NUCLEAR WEAPONS

INTRODUCTION

1. The enormity of the shadow which is cast over mankind by the possibility of nuclear war makes it essential that its effects be clearly and widely understood. It is not enough to know that nuclear weapons add a completely new dimension to man's powers of destruction. Published estimates of the effects of nuclear weapons range all the way from the concept of the total destruction of humanity to the belief that a nuclear war would differ from a conventional conflict, not in kind, but only in scale. The situation, however, is not as arbitrary as opposing generalizations such as these might suggest. There is one inescapable and basic fact. It is that the nuclear armouries which are in being already contain large megaton weapons every one of which has a destructive power greater than that of all the conventional explosive that has ever been used in warfare since the day gunpowder was discovered. Were such weapons ever to be used in numbers, hundreds of millions of people might be killed, and civilization as we know it, as well as organized community life, would inevitably come to an end in the countries involved in the conflict. Many of those who survived the immediate destruction, as well as others in countries outside the area of conflict, would be exposed to widely-spreading radio-active contamination, and would suffer from long-term effects of irradiation and transmit, to their offspring, a genetic burden which would become manifest in the disabilities of later generations.

2. These general propositions, whether set out dispassionately in scientific studies or directed as propaganda, have been proclaimed so often that their force has all but been lost through repetition. But their reality is none the less so stark that, unless the facts on which they are based are clearly set out, it will not be possible to realize the peril in which mankind now stands.

3. The purpose of the first section of this report is to provide a picture of the destructive power of nuclear weapons and of the consequences of their use. It gives a brief account of the destruction wrought in Hiroshima and Nagasaki by the explosion of single and relatively small nuclear weapons. These two disasters are the only examples of the actual use of nuclear weapons in war, and they provide direct information about the kind of casualties caused by nuclear explosions. The first section also outlines some theoretical studies of the physical effects of much larger nuclear weapons on centres of population and on the civilian economy, as well as the effect such weapons would have on major military targets. It deals too with the implications of so-called tactical nuclear warfare, that is to say of field warfare in which nuclear weapons are used. To achieve a measure of realism, most of these studies were related to actual, as opposed to hypothetical geographical areas, towns or cities, that is to say cities with a particular pattern of public services, communications and food supply. In a widespread exchange of strategic nuclear weapons many cities would suffer devastation similar to that of the examples studied, with a cumulative interacting effect which would greatly exceed the simple addition of the direct results of individual attacks. Accepting that an attacker could always have the advantage over a defender in terms of surprise and weight of attack, no attempt has been made to complicate the general story by analysing the extent to which an ABM defence,

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together with civil defence measures, might reduce the scale of damage and the number of casualties which would result from a nuclear attack. It is enough to note that there is no active defence system in sight which would prevent all nuclear weapons from reaching their selected targets.

4. Some technical details and general characteristics of nuclear explosions are set out in annex I to this section. The genetic effects of nuclear radiation are discussed in annex II.

HIROSHIMA AND NAGASAKI

Physical effects

5. The first atomic bomb to be used in warfare had a yield of nearly twenty kilotons, that is to say it had an explosive force equivalent to nearly 20,000 tons of conventional chemical explosive (e.g., TNT). It was detonated at approximately 550 metres above Hiroshima on 6 August 1945. On 9 August a second atomic device, with a similar yield, was detonated at about the same height over Nagasaki. In Hiroshima, destruction was concentric around the centre of a spreading city whose population was about 300,000. Within seconds, a rapidly growing fire-ball developed into a mushroom-like cloud, supported, as it were, on a column of black smoke, and the heat radiating from the fire-ball caused thousands of fires.

6. By comparison with Hiroshima, Nagasaki was a narrow city surrounded by hills and open to the sea in only one direction, with a population of about 87,000 people living within three kilometres from the centre. The immediate effects of the explosion were the same, but the area of destruction and fire differed in accordance with the different layout of the cities. In both cases the heat of the explosion was so intense that, up to a distance of about a half kilometre from the centre of the disaster, the surface of domestic ceramic roof tiles melted and firing of domestic wooden houses, by direct radiation, was observed up to one and a half kilometres.

7. There are varying estimates of the casualties[10] in Hiroshima and Nagasaki and it has proved difficult to estimate the exact numbers of exposed people who may have died after escaping from the city. Available estimates are that 78,000 were killed and 84,000 injured in Hiroshima, and that 27,000 were killed and 41,000 injured in Nagasaki. In addition, there were thousands missing in both towns. Most of the immediate fatal casualties were caused by the violent disruption of residential and office buildings. In Hiroshima 60,000 houses were completely or partially destroyed. Wooden houses within two and a half kilometres radius were carried away, while brick buildings were turned into heaps of rubble. Severe damage to houses occurred as far out as eight kilometres. Walls, doors, bricks, glass, furniture and other debris hurtled through the air, crushing or damaging everything in their way. Moderately close to "ground-zero", by which is meant the point on the ground directly below the explosion, buildings were pushed over bodily, and at greater distances were leaning away from the source of the blast.

8. No exact information is available concerning the relative importance of blast, burns and nuclear radiation as the causes of fatalities in these bombings. Burn injuries constituted the major problem in medical care. People exposed in the open had been severely burned, injuries from direct radiation being incurred as far out as about two kilometres from the centre of the

[10] The population and casualty figures referred to are taken from public announcements of local governments in Hiroshima and Nagasaki, six months after the explosions, based on reports by the survey mission of the National Research Council, Japan.

zone of destruction. From the day after the bombing, burns accounted for about one half of all the deaths. At the Kameyama Hospital in Hiroshima 53 per cent of the patients who received burns at one kilometre died within the first week and 75 per cent within two weeks. The peak mortality occurred on the fourth day. Another peak in deaths occurred in the third and the fourth week, when complications, especially those associated with radiation injury, set in. Twenty days after the attack it was found that, among burned survivors, the great majority (80-90 per cent) had suffered "flash" burns from the immediate absorption of the thermal radiation of the explosion on the exposed skin; some 5-15 per cent had suffered both flash and flame burns; a very few (2-3 per cent) had suffered flame burns only.

9. The explosion over Hiroshima rapidly led to a firestorm[11] which lasted for about six hours and which burned out an area of twelve square kilometres of the town. Within about two to three hours a wind, which started twenty minutes after the detonation of the bomb, reached a velocity of fifty to sixty kilometres per hour, blowing towards the burning city from all directions. Seventy per cent of the fire-fighting machines in Fire Brigade stations were rendered unusable, and 80 per cent of the fire-fighting personnel were unable to respond to the emergency. The loss of water pressure through the breaking of pipes, mainly due to the collapse of buildings, contributed greatly to the additional destruction by fire. But even if men and machines had survived the blast, many fires would have been inaccessible within one and a half kilometres from ground-zero.

10. About 45,000 of the fatal casualties in Hiroshima died on the day of the explosion, and some 20,000 during the following four months, as a result of traumatic wounds, burns and radiation effects. There are no estimates of the numbers who may have died from the effects of induced radio-activity experienced during rescue work in the city. Most of the medical facilities in Hiroshima were in the devastated area of the city, and the methods adopted for treating casualties were consequently far below standard. Difficulties were aggravated by shortage of supplies and equipment, and by the extraordinary demands made on crippled medical staffs. Next to immediate medical problems, the most serious challenge to those who had survived the direct effects of the explosion, were problems of water supply, housing and food. Electrical distribution systems suffered severely, first by damage to overhead lines, and secondly by damage to switch gear and transformers caused by collapse of the structures in which they were located. To people who were not immediate casualties these difficulties compounded the profound psychological effects of the disaster of which they were part. Even twenty years after the bombings there is an excessive sensitivity of the people to the thought of radiation hazard, leading to difficulties in obtaining agreement about the siting of nuclear power plants.

Long-term radiation effects

11. Apart from the effects which ionizing radiation had on the immediate victims of the explosions, the survivors were also exposed to the hazards of the radiation both in terms of latent disease occurring in the individual (somatic effects) and of changes in hereditary material (genetic effects). It had been suspected for some time that exposure to repeated moderate doses of nuclear radiation is conducive to leukaemia, a disease which is associated with a malignant

[11] A fire storm is not a special characteristic of nuclear explosion. It may be a consequence of a forest fire or an incendiary bomb attack, with high inward winds produced largely by the updraft of the heated air over an extensive burning area. The incidence of firestorms is dependent on conditions at the time of the attack, including the local availability of fuel.

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over-production of white blood cells. A study of the survivors of the two nuclear explosions, over Hiroshima and Nagasaki, shows that the disease can undoubtedly result from a large single (acute) dose of radiation. The incidence of leukaemia in the survivors of Hiroshima and Nagasaki was observed to be increasing in 1948. It reached a peak in 1950-1952. Although it seems to have decreased somewhat since then, it still remains much higher than in the unexposed population of the rest of Japan. While the incidence of the disease increased in all age groups, it did so rather more sharply in young people. The incidence in survivors was up to fifty times greater in those within about one kilometre of the explosion than in people who were further away. It was ten times greater for those within one and one and a half kilometres than for those between two and ten kilometres from ground-zero.

12. A continuing study of the survivors of the two Japanese disasters has also suggested an increased incidence for other kinds of malignant cancer, particularly cancer of the thyroid, and not just leukaemia, which has a much shorter latent interval. There is also a hint, but as yet no more than a hint, that the average expectation of life is less in the survivors of the exposed population whether or not they suffered malignant disease. This is an effect of radiation which has been proved in experimental animals. The indications are stronger that a significantly high proportion of the babies born to women who were pregnant when exposed to the explosion, and who survived, had heads smaller than average size, and that some of these suffered severe mental retardation.

13. Insufficient time has passed since these two nuclear disasters to determine what genetic changes, if any, were induced in the survivors. In any case, although long-term genetic effects would indeed be consequences of radiation in nuclear warfare, such effects are of prime concern only where the acute effects can be disregarded, i.e., in areas far removed from the immediate target areas in a nuclear war or under conditions of intense testing of nuclear weapons in the atmosphere. Hence for the purpose of this report, it has not been thought necessary to discuss fully the present state of knowledge about the genetic effects of ionizing radiation. Some facts concerning these effects are given in annex II. All that need be noted here is that radiation from nuclear explosions can cause genetic mutations and chromosome anomalies which may lead to serious physical and mental disabilities in future generations. These effects may arise either from the radiation released in the first few instants after a nuclear explosion or from that released through the later radio-active decay of the substances contained in "fall-out" from the explosion. In this connexion it should be noted that there was no significant local fall-out in either Hiroshima or Nagasaki since, in both cases, the explosions occurred fairly high in the atmosphere.

US admits years of atomic radiation tests on people

Simon Tisdall, *Guardian*, 30 December 1993, page 11

The new energy secretary has revealed decades of experiments on unwitting victims, and nuclear blasts in the air over civilians, reports Simon Tisdall in Washington

The door to a secret chamber of nuclear horrors is slowly being prised open in the United States, revealing government-ordered radiation experiments on retarded children, pregnant women, and convicts and a range of other clandestine atom-age projects which have shocked and frightened the American public.

In the course of the last month the steady drip of newly released records from the department of energy, the agency which has overseen America's military and civilian nuclear complex since the dawn of the nuclear era, has turned into a torrent.

Collectively, the records conjure up a nightmarish picture. They show how successive administrations, determined at all costs to keep ahead of the Soviet Union in the cold war nuclear arms race, repeatedly and perhaps illegally placed thousands of unsuspecting Americans at serious and lasting physical risk.

The government's human experiments, undisclosed atomic weapons tests, and deliberate radiation releases over populated areas began in 1945 after the atomic strike on Japan in August of that year. In some cases they have continued almost until the present day. They remained hidden for so long because of what Hazel O'Leary, President Clinton's new energy secretary, calls a culture of deception.

“We were shrouded and clouded in an atmosphere of secrecy,” Ms O'Leary said recently. “And I would take it a step further. I would call it repression.”

Having taken control of the energy department earlier this year, Ms O'Leary has clearly been shocked by what she found in its archives. In an unprecedented move she ordered the review of an estimated 32 million documents for possible declassification. Many have already been released. She also ordered a sweeping investigation into radiation experiments on humans.

Then, on Tuesday, Ms O'Leary took another extraordinary step for a senior government official. She said compensation for victims of the atom age programmes would have to be considered. “My view is that we must proceed with disclosing these facts and information regardless of the fact of whether it opens the door for a lawsuit against the government. “We ought to go forward and explain to the Congress what has happened and let Congress and the American public determine what would be appropriate compensation,” Ms O'Leary said. For America's defence establishment, it is as if a whistle-blower has suddenly become the boss.

So far, the department of energy records and related research by congressional and journalistic investigators have brought the following US government projects to light.

At least 19 mentally retarded boys were fed radioactive milk mixed with cereal in experiments conducted by scientists from Harvard and the Massachusetts Institute of Technology in the 1940s and 1950s.

The experiments, funded by the atomic energy commission, were not fully explained to the boys' parents. They were told, in a letter, that “we are considering the selection of a group of our brighter patients, including your son to receive a special diet”. The boys were told they were participating in a science club.

About 800 pregnant women were dosed with radioactive iron in a government-backed experiment at Vanderbilt university in Tennessee in the late 1940s. The objective was to gauge its

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effect on foetal development. A follow-up study found a higher than normal cancer rate among the women's children.

In experiments conducted at jails in Oregon and Washington states the testicles of more than 130 male inmates were exposed to high levels of radiation from X-ray machines. The prisoners were paid for their trouble, but according to Robert Alvarez, a senior aide to Ms O'Leary, the risks were not fully explained to them. “These prisoner studies were clearly unethical.” Mr Alvarez said this month. The experiments continued until the early 1970s. There have been no follow-up studies since the prisoners were released.

Eighteen patients with apparently dangerous illnesses were injected with high concentrations of plutonium at laboratories managed by Chicago and two other universities in experiments between 1945 to 1947. The injections were apparently made without the patients' informed consent.

Similar experiments using injections of radioactive calcium were conducted on terminally ill cancer patients in New York.

The purpose was to measure the rate at which radioactive substances are absorbed by human tissue.

A congressional report, drawing on department of energy material, disclosed this month that government scientists deliberately exploded atomic bombs in the atmosphere over the US in order to examine the spread and effects of radioactive fallout.

The report identified 12 such tests, including one in 1950 in New Mexico after which radiation particle levels were carefully measured in the town of Watrous, 70 miles away. At the time, scientists said there was no risk to people, even though their purpose was to develop a weapon that would kill enemy soldiers through radioactive fallout.

In fact, according to the Los Alamos national laboratory, nerve-centre of America's nuclear weapons research, there were about 240 experiments in which radiation was deliberately released into the atmosphere between 1944 and 1961 in New Mexico, Nevada, Utah, Washington state, and perhaps elsewhere.

“Releasing these amounts of radiation on people in an area in secret is a little hard to swallow,” said Senator John Glenn, the former astronaut, who is pushing for the release of other government departments' records, including those of the Pentagon.

All of this has come on top of Ms O'Leary's startling announcement on December 8 that the government conducted 204 previously undisclosed underground nuclear tests in the US between 1963 and 1990.

Among this total are 18 unannounced tests undertaken during the Reagan and Bush administrations. Independent experts said they were at a loss to explain exactly what these later tests were for, or why they were kept secret.

Ms O'Leary said that between 600 and 800 people were subjected to government radiation experiments; she has set up an public telephone inquiry service called the Human Experimentation Hotline. In its first day in operation last week the hotline was swamped with calls from worried families.

The number of Americans intentionally exposed to radioactive atom test fallout, and its lasting after-effects, is unknown.

But a study of high fall-out downwind areas in Utah, for example, has found childhood leukaemia rates which are 2.5 times the national average.

In part, the human experiments were an attempt to tackle incurable diseases, scientists of the period have said. It is also pointed out that there existed a great deal of honest ignorance about the effects of radioactive substances.

Much of the macabre “evidence” of human experimentation has been preserved. About 20,000 irradiated pieces of people are kept at a national human tissue depository in Spokane, in Washington state.

Environmentalists and others say that Ms O'Leary and her staff - some of whom were formerly active opponents of the energy department and the nuclear establishment - have opened a Pandora's Box.

And the scale of the problem is staggering. A report by the federal environmental protection agency estimated recently that more than 43,000 military and industrial sites in the US are or may be contaminated by radioactivity.

Ms O'Leary says that by opening the files she hopes to set an example for other nuclear powers and to improve the department of energy's public image as it begins its domestic post-Soviet nuclear clean-up. But most of all, she said recently, she wants the truth to come out.

When she learned of the human experiments she was “appalled and shocked and it just gave me an ache in my gut and my heart,” Ms O'Leary said.

Chilling, too, was the publication this week of a 1950 memorandum to senior atomic energy commission officials from a radiation biologist who worked for the agency. The memo, written by Dr Joseph Hamilton, warned that human experimentation was probably unethical, possibly illegal, and perhaps a breach of the Nuremberg Code of 1947. If the information became public, Dr Hamilton said, there would be a lot of criticism “as admittedly this would have a little of the Buchenwald touch”.

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Arjun Makhijani: **The Soviet Nuclear Waste Explosion America Helped Cover Up (And Other Crimes Against Public Health)**[*]

On September 29, 1957, at 4:20 p.m., an enormous explosion in a tank containing highly radioactive waste occurred in the Mayak nuclear weapons plant in the southern Ural mountains of the Soviet Union. The fallout plume spread strontium-90 and other dangerous radionuclides over about 15,000 square kilometers, which remain contaminated to this day. Food stores were closed, and more than 1,000 tons of food dumped. Farming was stopped for more than two decades on about 150,000 acres. More than 10,000 people were relocated, and their empty homes were torn down and buried as radioactive waste. Yet, none of the residents were told why. The Soviet government covered up the accident, only acknowledging the devastation in June 1989 as the Cold War was ending.[1]

Surprisingly, the West assisted the Soviet government in its cover-up. In 1976, Soviet dissident biologist Zhores Medvedev published an article in the New Scientist, a British science magazine, about the accident. Instead of denouncing the callous cover-up of the Soviets, however, the chairman of the United Kingdom Atomic Energy Authority, Sir John Hill, and other British experts dismissed the story as "rubbish" and "scientific fiction."[2]

The CIA also helped the cover-up. According to a 1959 CIA document, the agency knew that an accident had occurred that resulted in food stores being closed. The resulting food shortages created lines that were "reminiscent of the worst shortages during World War II." They also knew that high officials had been "wearing small radiation counters" while the public had no protection.

Yet, the CIA did not publicize the accident, even though it occurred during the height of the Cold War and at a time that both sides took every opportunity for propaganda advantage. The U.S. government did not condemn the Soviets for the secrecy and destruction of homes without informed consent. Was it because officials in the West feared that the public might raise questions about the possibility of a similar explosion in France, the United Kingdom, or the United States?

Indeed, since the dawn of the atomic age, millions of people in other parts of the world have been affected by bomb production and testing. American, British, French, and Soviet soldiers were ordered to participate in atomic war exercises. Children in the United States have seen their risk of cancers rise from drinking milk contaminated with fallout from atmospheric nuclear tests. Conditions for uranium miners in India are lamentable, and who knows what damage has been caused by nuclear weapons in China, Israel, North Korea, and Pakistan?

Few nuclear-weapon states have provided much information about the harm caused by their nuclear weapons establishments. For example, information about the intense fallout from French nuclear tests in Polynesia is coming to light only this year. The typical reaction of these establishments has been to deny damage, cover up problems, and simply assert national security requirements to be taken on trust, promulgated by fiat, or both.

The problem is by no means at an end, even leaving aside plans in the United States and other nuclear-weapon states to make more nuclear weapons. For example, poor radioactive waste disposal practices throughout the Cold War threaten some of the most important water re-

[*] Source: *Japan Focus* (9-26-05). *Arjun Makhijani is president of the Institute for Energy and Environmental Research in Takoma Park, Maryland. He is the principal editor Nuclear Wastelands: A Global Guide to Nuclear Weapons Production and Its Health and Environmental Effects (MIT Press: 2000).*

sources in the United States. These include putting high-level liquid radioactive wastes from reprocessing into tanks that have leaked a million gallons into the ground near the Columbia River and dumping plutonium-laden wastes into unlined pits above Snake River Plain Aquifer, southeastern Idaho's sole source aquifer.

Avoiding and Permitting Fallout

Efforts to keep damaging information about nuclear weapons hidden from the public began early. The very first nuclear test on July 16, 1945, led to severe fallout and hot spots of radioactive contamination 32 kilometers from the site. The affected people were not informed even after the bombings of Hiroshima and Nagasaki, nor were they evacuated. A fallout cloud hung over much of southeastern New Mexico in the days following the test, but even 60 years later, there has been no official investigation of the health effects. Col. Stafford Warren, a medical doctor in the Army who was the chief of radiation safety for the test, recommended that future tests should not be done within 240 kilometers of human habitation. The recommendation was ignored, with tragic effects.

In 1950, the United States had considered setting up a weapons testing site in North Carolina at a coastal location that would have allowed most fallout to land in the ocean. Instead, the United States chose to set up a continental nuclear weapons test site in Nevada with the knowledge that a western location would blow fallout over most of the country. The federal government risked the health of its citizens in large part to make life more convenient for weapons scientists at New Mexico's Los Alamos National Laboratory and to avoid the political difficulties of acquiring coastal private property through eminent domain.

When the site became operational, tests were conducted when the wind blew away from Las Vegas and Los Angeles. The result was ubiquitous fallout over most of the rest of the continental United States. The government reassured a skeptical public that it would provide ample warning of any dangers. Yet, it did not share the results of its 1950 research, which had shown that milk would be contaminated by fallout. Cows would eat grass on which iodine-131, an intensely radioactive fission product, had been deposited. The iodine-131 would concentrate in the milk. Growing children who drank the milk would get large doses of radiation to their thyroids, creating a risk of cancer and other thyroid diseases.[3]

Rather than address these realistic concerns, the military dismissed them. The opinion in military circles was that the public in the United States had a "hysterical and alarmist complex" about radiation that needed to be corrected to enable the United States to proceed with its testing activities. In internal documents, Department of Defense officials said the process of correction "would be a matter of reeducation over a long period of time." The objective was in direct contradiction to the advice given by Warren in July 1945: the "reeducation" was supposed to go on until "the public will accept the possibility of an atomic explosion within a hundred or so miles of their homes." At that point, the establishment of a test site in the continental United States would no longer be a problem. [4] People would then "feel at home with neutrons trotting around" and presumably become comfortable with nuclear tests nearby. It was after all, as the safety preparations were being done in December 1950, "the most important angle to get across."[5]

The cover-up was a spectacular success, although the fallout was intense. After two nuclear tests (Shot Harry and Shot Nancy), 1,420 lambing ewes and 2,970 lambs in Nevada, Utah, and Arizona died of severe radiation injuries.[6] In the lawsuit that followed,[7] the government's representatives provided what the judge nearly 30 years later concluded was "false and decep-

tive" representations, withheld information, and provided other information "in such a manner as to be deceitful" and, in sum, "manipulated" the court by "convoluted actions."

In 1997, when the National Cancer Institute acting under congressional directive assessed milk contamination, it found that fallout from the tests would eventually cause between 11,000 and 212,000 thyroid cancers. The cancer risk fell primarily to those who had been children, with girls being at twice the risk of boys. Those who believed that they were leading healthy farm lives by drinking fresh milk got the highest doses.

An atomic Kodak moment was playing out in a parallel political and economic universe in the very same period. The photographic film company found its film was getting fogged because the corn husks it was using to make packaging had become contaminated with fallout. Kodak threatened to sue. The government quickly provided data on anticipated patterns of fallout to Kodak and the rest of the photographic film industry so they could protect their products.[8] Was it because Kodak knew too much? Was it because film was more precious than milk?

As a way to avoid publicity and lessen the political consequences, the United States and other countries also often tested weapons in areas home to foreign subjects or minority populations. The United States located its test sites in the Marshall Islands and on land claimed by the Western Shoshones in Nevada. The Soviets located their major test site in the land of the Kazakhs, near Semipalatinsk. The British conducted their tests on native lands in Australia and on Christmas Island in the Pacific. The Chinese located theirs on minority lands in western China. The French test sites were in the colonies in Algeria and Polynesia.

According to France's conservative newspaper, Le Figaro, although fallout was anticipated and the genetic risk for the native population was considered greater than that for the general French public, "a preventive relocation of the people of the Gambiers [archipelago] was ruled out for political and psychological reasons." Further, the evacuation of old people and children "who comprised a large fraction" of the population was considered "the most difficult," so they were left in the path of the fallout.[9]

To be sure, the cover-ups were not entirely successful. Public protests in the 1950s and concerns about contamination of mother's milk and baby's teeth with strontium-90 were central to the Partial Test Ban Treaty, which the Soviet Union, United Kingdom, and the United States signed in 1963. In a real, practical sense, the first arms control treaty was an environmental one. Yet, China and France did not sign. The French did not stop atmospheric testing until 1974; the Chinese did so in 1980.

Moving tests underground did not end the problem, even though it did greatly mitigate the problem of radiation doses from short-lived radionuclides such as iodine-131. Large amounts of plutonium, iodine-129, cesium-135, and other long-lived radionuclides remain underground at the test sites. They possess the potential for migration into water bodies in the long term. No cleanup method has yet been devised.

The frequent claims of safety and lack of deleterious health effects of nuclear tests are perhaps most clearly contradicted by military plans to use fallout as a terror weapon. The fallout from the first ever underwater test at Bikini in July 1946 was so ubiquitous and so insidious in its effects that the Joint Chiefs of Staff evaluation of the military aspects of the tests concluded that fallout may constitute a weapon of war. Of the long-term effects of the radioactivity, the 1947 evaluation stated that the contaminated areas: irregular in size and shape, as wind and topography might form them, would have no visible boundaries. No survivor could be certain he

was not among the doomed, and so added to every terror of the moment, thousands would be stricken with the fear of death and the uncertainty of the time of its arrival."[10]

Overall, estimates of cancer fatalities due to the global radiation doses from the atmospheric nuclear testing program of the five nuclear-weapon states that are parties to the nuclear Non-proliferation Treaty and that are also the only permanent members of the UN Security Council, which gives them veto power over global security decisions, run into hundreds of thousands between the start of testing in 1945 and the end of the 21st century.

There are considerable uncertainties in the risk of cancer death from exposure to low levels of radiation, but all careful scientific evaluations, including the most recent ones, have concluded that every increment of exposure to radiation produces an incremental risk of cancer. The range of estimates of cancer deaths as a result of testing fallout, using the official U.S. Environmental Protection Agency cancer risk coefficients, is between about 200,000 to more than half a million.[11] The number of cancer cases, including thyroid cancer, which has a low fatality rate (about 5 percent), would be considerably greater. No sound global estimate of cancer incidence is possible because no study comparable to the 1997 U.S. National Cancer Institute study has been carried out on a global scale. Indeed, even the thyroid cancer risk in Canada due to testing in Nevada has not been evaluated, although it is apparent from the National Cancer Institute study as well as the similar dietary patterns between Canada and the United States that people in several parts of Canada would have been significantly affected.

Further Dangers

That was not the only damage caused by nuclear weapons establishments. There are many other examples. Some from the United States include:

• From the 1940s into the 1970s, more than 23,000 people were subjected to radiation experiments, many without their informed consent. They were administered by the Atomic Energy Commission (AEC), the Department of Energy, the Department of Defense, NASA, and the Department of Veterans Affairs for purposes including determining the biology of radiation intakes, developing radiation weapons, and determining radiation's effects on military personnel performance on the battlefield. One experiment involved feeding oatmeal with radioactive trace elements to more than 100 boys at a Massachusetts school. Others included testicular irradiation experiments on prisoners to determine what doses induce sterility and experiments on pregnant women. In 1993, after learning of a particularly troubling series of experiments involving the injection of plutonium into unknowing subjects, then-Secretary of Energy Hazel O'Leary remarked, "The only thing I could think of was Nazi Germany."[12]

• A quarter of a million armed forces personnel participated in nuclear weapons tests in the United States alone. They were marched into ground zero, they scrubbed plutonium from the decks of contaminated ships, and they flew planes through the mushroom clouds to sample them and to test how pilots might function in a nuclear war environment. It took until the end of the 1980s for the U.S. government to recognize the harm and begin a compensation program.

• During the Cold War, more than half a million weapons complex workers in the United States were exposed to radioactivity and chemicals in the course of their work. In the early decades, many were exposed without proper information or training, with authorities sometimes hiding the risks so that hazard duty would not have to be paid, among other reasons.[13] The atomic weapons establishment did not actually calculate radiation doses to workers received due to inhalation and ingestion, even though data were being collected and analyzed in

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the form of urine samples. Congress passed a compensation program for nuclear weapons workers in October 2000.

• During the 1950s, it was well known that exposure to radon and its decay products in unventilated mines was a health hazard and increased the risk of lung cancer, but the AEC, the Department of Energy's predecessor, did not require that the mines be ventilated, choosing instead to emphasize production.[14]

Even today, people who live along the Savannah River and use its water downstream of the Savannah River Site, a nuclear weapons materials plant, are drinking water contaminated with tritium, which is radioactive hydrogen. This contamination level is at about 5 percent of the present-day drinking water standard. However, these standards are set for a grown male, called "standard man," and they do not consider the effects of radioactive water on developing fetuses. They do not consider miscarriages and other non-cancer effects. No removal is planned of the source of the tritium contamination, which lies in the unlined pits and trenches where radioactive waste was dumped in cardboard and wooden boxes. Unless the long-lived and especially risky wastes, such as liquid high-level wastes in tanks, are recovered and stabilized and isolated from the human environment, the risks will persist.

The most recent insult from the nuclear establishment comes via the Environmental Protection Agency. Its Office of Radiation and Indoor Air has proposed standards for geologic isolation of highly radioactive commercial and military wastes for the very long-term (beyond 10,000 years) for the proposed Yucca Mountain, Nevada site that would set radiation protection back decades. The proposed rule is far more lax than any other Western country. By allowing a radiation dose of 350 millirem per year, women exposed over a lifetime would have a 1 in 30 chance of getting cancer as a result [15]. If radioactivity leaks are at the higher end of estimated values (resulting in a dose of about 2,000 millirem per year), the lifetime risk for women of getting cancer due to the exposure would be about one in five.

Some argue that that we need not worry about radiation doses at times so far into the future. There are other risks that are far greater here and now and in the coming years, decades, and centuries. Indeed., there are. The main risk exposed by the reasoning behind the proposed Yucca Mountain standard and other recent backsliding on nuclear waste management is that the government is willing to jettison rules and norm designed to protect the public, no matter how well established, to accommodate powerful political and financial interests, including in the nuclear industry. Yucca Mountain has repeatedly been demonstrated to be a site that is unlikely to meet the government's rules for radiation protection. But instead of trying to find a new site, those rules have been changed at least three times in major ways, the most recent being the EPA proposal for acceptable levels of long-term exposure.

Hundreds of thousands of people have been similarly affected in other nuclear-weapon states. The main difference between them and the United States has been that the United States has been more open and hence has, under public pressure, acknowledged a wider scope and depth of harm, although that task is still far from done. India has strict secrecy laws surrounding its nuclear weapons activities, much like France and the United Kingdom. The least is known about China, Pakistan, Israel, and North Korea.

It is a remarkable fact of nuclear weapons history and radiation risk that every nuclear-weapon state has first of all harmed its own people in the name of national security. For the most part, they have done so without informed consent. Nor is the damage confined to nuclear- weapon possessors. Uranium for nuclear weapons was mined in many non-nuclear-weapon states.

France got its uranium in large measure from its colonies, where working conditions in mines were—and continue to be—scandalous. The United Kingdom got its uranium partly from Namibia. The Soviets got much of their uranium from vast operations in Eastern Europe, notably in East Germany and the former Czechoslovakia. Health and environmental problems have typically been serious, so far as independent evidence indicates, but have usually been officially denied.[16]

The statement of then-Deputy Secretary of Energy W. Henson Moore at Rocky Flats in June of 1989 at the end of the Cold War was a kind of mea culpa about this. Nuclear weapons production, he told The Washington Post, has been "a secret operation not subject to laws... no one was to know what was going on." He added that "the way the government and its contractors operated these plants was: This is our business, it's national security, everybody else butt out." The "everybody else" he was referring to was not a foreign power, but the people of the United States. Other countries have not had a comparable confession, although their nuclear establishments have been as high-handed and their people have likely suffered similar kinds of consequences.

In a reverse of the doctors' dictum to "first do no harm," nuclear weapons establishments have first harmed the people of their own countries, as well others around the world. They have shown a readiness to harm. Given the nature of the problem and its main sources, the permanent members of the UN General Assembly and the UN Security Council should call for a global truth commission to investigate the harm that nuclear weapons production and testing have done and continue to do to people all over the world.

ENDNOTES

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2. Ibid.
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4. IPPNW and IEER, Radioactive Heaven and Earth: The Health and Environmental Risks of Nuclear Weapons Testing in, on, and Above the Earth (New York: Apex Press, 1991), chap. 4.
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7. IPPNW and IEER, Radioactive Heaven and Earth, p. 59.
8. Ortmeyer and Makhijani.
9. "Polynésie: Le Mensonge Nucléaire," Le Figaro, May 19, 2005.
10. IPPNW and IEER, Plutonium, p. 143 (U.S. Joint Chiefs of Staff evaluation of the 1946 tests at Bikini Atoll).
11. The total committed dose equivalent to the global population through the year 2100 is estimated at 544 million person-rem. IPPNW and IEER, Radioactive Heaven and Earth, p. 37. The doses are much larger if estimated for longer periods, mainly due to the very long-lived radionuclides, of which the most important is carbon-14, which gets into food and becomes incorporated into our bodies and all ecosystems. Carbon-14 has a half-life of 5,730 years, meaning that significant amounts will remain for tens of thousands of years in the atmosphere in the form of radioactive carbon dioxide, to be taken up

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by plants. Carbon-14 also occurs naturally, created mainly by the interaction of cosmic rays with nitrogen in the atmosphere.

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TEN MYTHS ABOUT NUCLEAR WEAPONS

By David Krieger and Angela McCracken

1. Nuclear weapons were needed to defeat Japan in World War II.
It is widely believed, particularly in the United States, that the use of nuclear weapons against the Japanese cities of Hiroshima and Nagasaki was necessary to defeat Japan in World War II. This is not, however, the opinion of the leading US military figures in the war, including General Dwight Eisenhower, General Omar Bradley, General Hap Arnold and Admiral William Leahy. General Eisenhower, for example, who was the Supreme Allied Commander Europe during World War II and later US president, wrote, "I had been conscious of a feeling of depression and so I voiced [to Secretary of War Stimson] my grave misgivings, first on the basis of my belief that Japan was already defeated and that dropping the bomb was completely unnecessary, and secondly because I thought that our country should avoid shocking world opinion by the use of a weapon whose employment was, I thought, no longer mandatory as a measure to save American lives. It was my belief that Japan was, at that very moment, seeking some way to surrender with a minimum loss of 'face'…." Not only was the use of nuclear force unnecessary, its destructive force was excessive, resulting in 220,000 deaths by the end of 1945.

2. Nuclear weapons prevented a war between the United States and the Soviet Union.
Many people believe that the nuclear standoff during the Cold War prevented the two superpowers from going to war with each other, for fear of mutually assured destruction (MAD). While it is true that the superpowers did not engage in nuclear warfare during the Cold War, there were many confrontations between them that came uncomfortably close to nuclear war, the most prominent being the 1962 Cuban Missile Crisis. There were also many deadly conflicts and "proxy" wars carried out by the superpowers in Asia, Africa and Latin America. The Vietnam War, which took several million Vietnamese lives and the lives of more than 58,000 Americans, is a prominent example. These wars made the supposed nuclear peace very bloody and deadly. Lurking in the background was the constant danger of a nuclear exchange. The Cold War was an exceedingly dangerous time with a massive nuclear arms race, and the human race was extremely fortunate to have survived it without suffering a nuclear war.

3. Nuclear threats have gone away since the end of the Cold War.
In light of the Cold War's end, many people believed that nuclear threats had gone away. While the nature of nuclear threats has changed since the end of the Cold War, these threats are far from having disappeared or even significantly diminished. During the Cold War, the greatest threat was that of a massive nuclear exchange between the United States and Soviet Union. In the aftermath of the Cold War, a variety of new nuclear threats have emerged. Among these are the following dangers:

- Increased possibilities of nuclear weapons falling into the hands of terrorists who would not hesitate to use them;
- Nuclear war between India and Pakistan;
- Policies of the US government to make nuclear weapons smaller and more usable;
- Use of nuclear weapons by accident, particularly by Russia, which has a substantially weakened early warning system; and

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● Spread of nuclear weapons to other states, such as North Korea, that may perceive them to be an "equalizer" against a more powerful state.

4. The United States needs nuclear weapons for its national security.
There is a widespread belief in the United States that nuclear weapons are necessary for the US to defend against aggressor states. US national security, however, would be far improved if the US took a leadership role in seeking to eliminate nuclear weapons throughout the world. Nuclear weapons are the only weapons that could actually destroy the United States, and their existence and proliferation threaten US security. Continued high-alert deployment of nuclear weapons and research on smaller and more usable nuclear weapons by the US, combined with a more aggressive foreign policy, makes many weaker nations feel threatened. Weaker states may think of nuclear weapons as an equalizer, giving them the ability to effectively neutralize the forces of a threatening nuclear weapons state. Thus, as in the case of North Korea, the US threat may be instigating nuclear weapons proliferation. Continued reliance on nuclear weapons by the United States is setting the wrong example for the world, and is further endangering the country rather than protecting it. The United States has strong conventional military forces and would be far more secure in a world in which no country had nuclear arms.

5. Nuclear weapons make a country safer.
It is a common belief that nuclear weapons protect a country by deterring potential aggressors from attacking. By threatening massive retaliation, the argument goes, nuclear weapons prevent an attacker from starting a war. To the contrary, nuclear weapons are actually undermining the safety of the countries that possess them by providing a false sense of security. While deterrence can provide some psychological sense of security, there are no guarantees that the threat of retaliation will succeed in preventing an attack. There are many ways in which deterrence could fail, including misunderstandings, faulty communications, irrational leaders, miscalculations and accidents. In addition, the possession of nuclear weapons enhances the risks of terrorism, proliferation and ultimately nuclear annihilation.

6. No leader would be crazy enough to actually use nuclear weapons.
Many people believe that the threat of using nuclear weapons can go on indefinitely as a means of deterring attacks because no leader would be crazy enough to actually use them. Unfortunately, nuclear weapons have been used, and it is likely that most, if not all, leaders possessing these weapons would, under certain conditions, actually use them. US leaders, considered by many to be highly rational, are the only ones who have ever actually used nuclear weapons in war, against Hiroshima and Nagasaki. Outside of these two bombings, the leaders of nuclear weapons states have repeatedly come close to using nuclear weapons. Nuclear deterrence is based upon a believable threat of nuclear retaliation, and the threat of nuclear weapons use has been constant during the post World War II period. US policy currently calls for the use of nuclear weapons in response to an attack with chemical or biological weapons against the US, its troops or allies. One of the premises of the US argument for preventive war is that other leaders would be willing to attack the United States with nuclear weapons. Threats of nuclear attack by India and Pakistan provide still another example of nuclear brinksmanship that could turn into a nuclear war. Globally and historically, leaders have done their best to prove that they would use nuclear weapons. Assuming that they would not do so is unwise.

7. Nuclear weapons are a cost-effective method of national defense.
Some have argued that nuclear weapons, with their high yield of explosive power, offer the benefit of an effective defense for minimum investment. This is one reason behind ongoing research into lower-yield tactical nuclear weapons, which would be perceived as more usable. The cost of nuclear weapons research, development, testing, deployment and maintenance, however, exceeded **$5.5 *trillion*** by 1996, according to a study by the Brookings Institution. With advances in nuclear technology and power, the costs and consequences of a nuclear war would be immeasurable.

8. Nuclear weapons are well protected and there is little chance that terrorists could get their hands on one.
Many people believe that nuclear weapons are well protected and that the likelihood of terrorists obtaining these weapons is low. In the aftermath of the Cold War, however, the ability of the Russians to protect their nuclear forces has declined precipitously. In addition, a coup in a country with nuclear weapons, such as Pakistan, could lead to a government coming to power that was willing to provide nuclear weapons to terrorists. In general, the more nuclear weapons there are in the world and the more nuclear weapons proliferate to additional countries, the greater the possibility that nuclear weapons will end up in the hands of terrorists. The best remedy for keeping nuclear weapons out of the hands of terrorists is to drastically reduce their numbers and institute strict international inspections and controls on all nuclear weapons and weapons-grade nuclear materials in all countries, until these weapons and the materials for making them can be eliminated.

9. The United States is working to fulfill its nuclear disarmament obligations.
Most US citizens believe that the United States is working to fulfill its nuclear disarmament obligations. In fact, the United States has failed to fulfill its obligations under Article VI of the Nuclear Non-Proliferation Treaty, requiring good faith efforts to achieve nuclear disarmament, for more than 30 years. The United States has failed to ratify the Comprehensive Test Ban Treaty and has withdrawn from the Anti-Ballistic Missile Treaty. The 2003 Strategic Offensive Reductions Treaty (SORT) with Russia takes strategic nuclear weapons off active deployment, but has no provisions for verification or systematic reductions and it fails to adhere to the principle of irreversibility agreed to at the 2000 Non-Proliferation Treaty Review Conference. The treaty seeks maximum flexibility for rearmament rather than irreversible reductions in nuclear arms. Nuclear weapons taken off active deployment will be put in storage where they will actually become more vulnerable in both the US and Russia to theft by terrorists. In the year 2012, the treaty will end, unless extended.

10. Nuclear weapons are needed to combat threats from terrorists and "rogue states."
It has been argued that nuclear weapons are needed to protect against terrorists and "rogue states." Yet nuclear weapons, whether used for deterrence or as offensive weaponry, are not effective for this purpose. The threat of nuclear force cannot act as a deterrent against terrorists because they do not have a territory to retaliate against. Thus, terrorists would not be prevented from attacking a country for fear of nuclear retaliation. Nuclear weapons also cannot be relied on as a deterrent against "rogue states" because their responses to a nuclear threat may be irrational and deterrence relies on rationality. If the leaders of a rogue state do not use the same calculus regarding their losses from retaliation, deterrence can easily fail. As offensive weaponry, nuclear force only promises tremendous destruction to troops, civilians and the en-

vironment. It might work to annihilate a rogue state, but the amount of force entailed in using nuclear weaponry is indiscriminate, disproportionate and highly immoral. It would not be useful against terrorists because strategists could not be certain of locating an appropriate target for retaliation.

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7/07/03

"Peace is the only battle worth waging." --- Albert Camus

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Resolutions on disarmament of the 66th UN General Assembly

During the first part of its 66th regular session (September to December 2011), the General Assembly of the United Nations adopted 254 resolutions. Of these, 47 were recommended by the the First Committee, which is assigned the items regarding disarmament and international security. There were another eight on those items without counting the numerous resolutions on peace-keeping operations. Those 55 resolutions are listed below. Included are the resolution number (65/...), its origin (First Committee [1], Fourth or Special Political and Decolonization [4], Sixth, Legal Affairs [6] or Plenary [P]), the date of its adoption, the vote (or without a vote [WV]) and item. Those resolution with a shadow deal with different aspects of nuclear weapons.

The resolutions assigned to each participant are listed at the end.

Num.	Co.	Date	Vote	Item
007	P	2 Nov. 2011	WV	REPORT OF THE INTERNATIONAL ATOMIC ENERGY AGENCY
010	P	18 Nov. 2011	WV	UN COUNTER-TERRORISM CENTRE
013	P	30 Nov. 2011	WV	THE SITUATION IN AFGHANISTAN
020	1	2 Dec. 2011	WV	OBJECTIVE INFORMATION ON MILITARY MATTERS, INCLUDING TRANSPARENCY OF MILITARY EXPENDITURES
021	1	2 Dec. 2011	168-1-1	PROHIBITION OF THE DEVELOPMENT AND MANUFACTURE OF NEW TYPES OF WEAPONS OF MASS DESTRUCTION AND NEW SYSTEMS OF SUCH WEAPONS: REPORT OF THE CONFERENCE ON DISARMAMENT
022	1	2 Dec. 2011	124-4-46	IMPLEMENTATION OF THE DECLARATION OF THE INDIAN OCEAN AS A ZONE OF PEACE
023	1	2 Dec. 2011	WV	AFRICAN NUCLEAR-WEAPON-FREE ZONE TREATY
024	1	2 Dec. 2011	WV	DEVELOPMENTS IN THE FIELD OF INFORMATION AND TELECOMMUNICATIONS IN THE CONTEXT OF INTERNATIONAL SECURITY
025	1	2 Dec. 2011	WV	ESTABLISHMENT OF A NUCLEAR-WEAPON-FREE ZONE IN THE REGION OF THE MIDDLE EAST
026	1	2 Dec. 2011	120-0-57	CONCLUSION OF EFFECTIVE INTERNATIONAL ARRANGEMENTS TO ASSURE NON-NUCLEAR-WEAPON STATES AGAINST THE USE OR THREAT OF USE OF NUCLEAR WEAPONS
027	1	2 Dec. 2011	176-0-2	PREVENTION OF AN ARMS RACE IN OUTER SPACE
028	1	2 Dec. 2011	118-52-6	FOLLOW-UP TO NUCLEAR DISARMAMENT OBLIGATIONS AGREED TO AT THE 1995, 2000 AND 2010 REVIEW CONFERENCES OF THE PARTIES TO THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS
029	1	2 Dec. 2011	162-0-18	IMPLEMENTATION OF THE CONVENTION ON THE PROHIBITION OF THE USE, STOCKPILING, PRODUCTION AND TRANSFER OF ANTI-PERSONNEL MINES AND ON THEIR DESTRUCTION
030	1	2 Dec. 2011	WV	RELATIONSHIP BETWEEN DISARMAMENT AND DEVELOPMENT
031	1	2 Dec. 2011	WV	OBSERVANCE OF ENVIRONMENTAL NORMS IN THE

				DRAFTING AND IMPLEMENTATION OF AGREEMENTS ON DISARMAMENT AND ARMS CONTROL
032	1	2 Dec. 2011	125-5-48	PROMOTION OF MULTILATERALISM IN THE AREA OF DISARMAMENT AND NON-PROLIFERATION
033	1	2 Dec. 2011	175-0-3	2015 REVIEW CONFERENCE OF THE PARTIES TO THE TREATY ON THE NON-PROLIFERATION OF NUCLEAR WEAPONS AND ITS PREPARATORY COMMITTEE
034	1	2 Dec. 2011	WV	ASSISTANCE TO STATES FOR CURBING THE ILLICIT TRAFFIC IN SMALL ARMS AND LIGHT WEAPONS AND COLLECTING THEM
035	1	2 Dec. 2011	WV	IMPLEMENTATION OF THE CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION, STOCKPILING AND USE OF CHEMICAL WEAPONS AND ON THEIR DESTRUCTION
036	1	2 Dec. 2011	WV	REGIONAL DISARMAMENT
037	1	2 Dec. 2011	175-1-2	CONVENTIONAL ARMS CONTROL AT THE REGIONAL AND SUBREGIONAL LEVELS
038	1	2 Dec. 2011	WV	CONFIDENCE-BUILDING MEASURES IN THE REGIONAL AND SUBREGIONAL CONTEXT
039	1	2 Dec. 2011	156-0-23	TRANSPARENCY IN ARMAMENTS
040	1	2 Dec. 2011	169-6-6	TOWARDS A NUCLEAR-WEAPON-FREE WORLD: ACCELERATING THE IMPLEMENTATION OF NUCLEAR DISARMAMENT COMMITMENTS
041	1	2 Dec. 2011	WV	NATIONAL LEGISLATION ON TRANSFER OF ARMS, MILITARY EQUIPMENT AND DUAL-USE GOODS AND TECHNOLOGY
042	1	2 Dec. 2011	WV	PROBLEMS ARISING FROM THE ACCUMULATION OF CONVENTIONAL AMMUNITION STOCKPILES IN SURPLUS
043	1	2 Dec. 2011	WV	TREATY ON THE SOUTH-EAST ASIA NUCLEAR-WEAPON-FREE ZONE (BANGKOK TREATY)
044	1	2 Dec. 2011	158-2-21	TREATY BANNING THE PRODUCTION OF FISSILE MATERIAL FOR NUCLEAR WEAPONS OR OTHER NUCLEAR EXPLOSIVE DEVICES
045	1	2 Dec. 2011	169-1-11	UNITED ACTION TOWARDS THE TOTAL ELIMINATION OF NUCLEAR WEAPONS
046	1	2 Dec. 2011	130-26-23	FOLLOW-UP TO THE ADVISORY OPINION OF THE INTERNATIONAL COURT OF JUSTICE ON THE LEGALITY OF THE THREAT OR USE OF NUCLEAR WEAPONS
047	1	2 Dec. 2011	WV	THE ILLICIT TRADE IN SMALL ARMS AND LIGHT WEAPONS IN ALL ITS ASPECTS
048	1	2 Dec. 2011	117-49-13	REDUCING NUCLEAR DANGER
049	1	2 Dec. 2011	161-0-18	COMPLIANCE WITH NON-PROLIFERATION, ARMS LIMITATION AND DISARMAMENT AGREEMENTS AND COMMITMENTS
050	1	2 Dec. 2011	WV	MEASURES TO PREVENT TERRORISTS FROM ACQUIRING WEAPONS OF MASS DESTRUCTION
051	1	2 Dec. 2011	117-45-18	NUCLEAR DISARMAMENT
052	1	2 Dec. 2011	WV	PROHIBITION OF THE DUMPING OF RADIOACTIVE WASTES
053	1	2 Dec. 2011	WV	UN REGIONAL CENTRES FOR PEACE AND DISARMAMENT
054	1	2 Dec. 2011	WV	UN REGIONAL CENTRE FOR PEACE, DISARMAMENT AND DEVELOPMENT IN LATIN AMERICA AND THE

				CARIBBEAN
055	1	2 Dec. 2011	WV	REGIONAL CONFIDENCE-BUILDING MEASURES: ACTIVITIES OF THE UN STANDING ADVISORY COMMITTEE ON SECURITY QUESTIONS IN CENTRAL AFRICA
056	1	2 Dec. 2011	WV	UN REGIONAL CENTRE FOR PEACE AND DISARMAMENT IN ASIA AND THE PACIFIC
057	1	2 Dec. 2011	117-48-12	CONVENTION ON THE PROHIBITION OF THE USE OF NUCLEAR WEAPONS
058	1	2 Dec. 2011	WV	UN REGIONAL CENTRE FOR PEACE AND DISARMAMENT IN AFRICA
059	1	2 Dec. 2011	WV	REPORT OF THE CONFERENCE ON DISARMAMENT
060	1	2 Dec. 2011	WV	REPORT OF THE DISARMAMENT COMMISSION
061	1	2 Dec. 2011	167-6-5	THE RISK OF NUCLEAR PROLIFERATION IN THE MIDDLE EAST
062	1	2 Dec. 2011	WV	CONVENTION ON PROHIBITIONS OR RESTRICTIONS ON THE USE OF CERTAIN CONVENTIONAL WEAPONS WHICH MAY BE DEEMED TO BE EXCESSIVELY INJURIOUS OR TO HAVE INDISCRIMINATE EFFECTS
063	1	2 Dec. 2011	WV	STRENGTHENING OF SECURITY AND COOPERATION IN THE MEDITERRANEAN REGION
064	1	2 Dec. 2011	175-1-3	COMPREHENSIVE NUCLEAR-TEST-BAN TREATY
065	1	2 Dec. 2011	WV	CONVENTION ON THE PROHIBITION OF THE DEVELOPMENT, PRODUCTION AND STOCKPILING OF BACTERIOLOGICAL (BIOLOGICAL) AND TOXIN WEAPONS AND ON THEIR DESTRUCTION
066	1	2 Dec. 2011	WV	REVITALIZING THE WORK OF THE CONFERENCE ON DISARMAMENT AND TAKING FORWARD MULTILATERAL DISARMAMENT NEGOTIATIONS
069	4	9 Dec 2011	WV	ASSISTANCE IN MINE ACTION
070	4	9 Dec 2011	WV	EFFECTS OF ATOMIC RADIATION
071	4	9 Dec 2011	WV	INTERNATIONAL COOPERATION IN THE PEACEFUL USES OF OUTER SPACE
099	6	9 Dec 2011	WV	EFFECTS OF ARMED CONFLICTS ON TREATIES
105	6	9 Dec 2011	WV	MEASURES TO ELIMINATE INTERNATIONAL TERRORISM

The following participants should review the resolutions listed below:

Resolutons*	**Participant**
A/RES/66/25, 44 and 61	5, 8, 9, 13, 17 and 21
A/RES/66/40, 45 and 51	3, 7, 10, 14, 18 and 22
A/RES/66/26, 46 and 57	2, 4, 12, 16, 20, 23 and 25
A/RES/66/28, 48 and 64	1, 6, 11, 15, 19 and 24

* The texts of the resolutions are found in the UN web site: www.un.org *then* Welcome *then* Main bodies *then* General Assembly *then* resolutions.

Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and under Water

SIGNED THE USSR, UK AND USA: 8 AUGUST 1963
ENTERED INTO FORCE: 10 OCTOBER 1963
DEPOSITARY GOVERNMENTS: RUSSIAN FEDERATION,UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND AND UNITED STATES OF AMERICA

The Governments of the United States of America, the United Kingdom of Great Britain and Northern Ireland, and the Union of Soviet Socialist Republics, hereinafter referred to as the "Original Parties,"

Proclaiming as their principal aim the speediest possible achievement of an agreement on general and complete disarmament under strict international control in accordance with the objectives of the United Nations which would put an end to the armaments race and eliminate the incentive to the production and testing of all kinds of weapons, including nuclear weapons,

Seeking to achieve the discontinuance of all test explosions of nuclear weapons for all time, determined to continue negotiations to this end, and desiring to put an end to the contamination of man's environment by radioactive substances,

Have agreed as follows:

Article I

1. Each of the Parties to this Treaty undertakes to prohibit, to prevent, and not to carry out any nuclear weapon test explosion, or any other nuclear explosion, at any place under its jurisdiction or control:

(a) in the atmosphere; beyond its limits, including outer space; or under water, including territorial waters or high seas; or

(b) in any other environment if such explosion causes radioactive debris to be present outside the territorial limits of the State under whose jurisdiction or control such explosion is conducted. It is understood in this connection that the provisions of this subparagraph are without prejudice to the conclusion of a Treaty resulting in the permanent banning of all nuclear test explosions, including all such explosions underground, the conclusion of which, as the Parties have stated in the Preamble to this Treaty, they seek to achieve.

2. Each of the Parties to this Treaty undertakes furthermore to refrain from causing, encouraging, or in any way participating in, the carrying out of any nuclear weapon test explosion, or any other nuclear explosion, anywhere which would take place in any of the environments described, or have the effect referred to, in paragraph 1 of this Article.

Article II

1. Any Party may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to this Treaty. Thereafter, if requested to do so by one-third or more of the Parties, the Depositary Governments shall convene a conference, to which they shall invite all the Parties, to consider such amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to this Treaty, including the votes of all of the Original Parties. The amendment shall enter into force for all Parties upon the deposit of instruments of ratification by a majority of all the Parties, including the instruments of ratification of all of the Original Parties.

NPT Tutorial: History – The Beginnings

This is Chapter 3 of the Nuclear Threat Initiative (nti.org) tutorial on the NPT. This material is produced independently for NTI by the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies and does not necessarily reflect the opinions of and has not been independently verified by NTI or its directors, officers, employees, agents. *Copyright © 2008 by MIIS.*

The Treaty on the Non-Proliferation of Nuclear Weapons (NPT) is the result of a long line of negotiations among various states concerned with the use of nuclear technology for both peaceful and destructive purposes. With the nuclear bombing of Hiroshima and Nagasaki in mind and risks of the spread of nuclear weapon technology growing, the international community sought ways to prevent any future use or acquisition of such destructive weapons.

In 1946, the UN General Assembly established the UN Atomic Energy Commission "to deal with the problems raised by the discovery of nuclear energy." Due to disagreements between the United States and the Soviet Union, this commission was unsuccessful in drafting a non-proliferation treaty.

Later that year, the United States proposed the Baruch Plan, named after U.S. diplomat Bernard Baruch. According to this plan, the United States would give up its nuclear weapon program after all other states had ceded their nuclear materials to international control. The Soviet Union opposed the plan as too advantageous to the United States and wanted the United States to turn over its nuclear weapons before other countries gave up their nuclear materials. These differences could not be resolved. The Soviet Union tested its first nuclear weapon in 1949, and by 1950, both the Soviet Union and the United States were engaged in a nuclear arms race. In 1952, the United Kingdom tested nuclear weapons for the first time.

In the 1950s, several programs were launched to develop peaceful nuclear projects and guard against nuclear weapons proliferation. In 1953, U.S. President Dwight Eisenhower established the "Atoms for Peace" program through which the United States concluded nuclear cooperation agreements with 40 friendly countries between 1956 and 1959. As a result, 26 states that accepted U.S. safeguards on U.S.-origin nuclear materials and equipment against military use of nuclear technology were provided with research reactors, nuclear training, and reactor fuel (fissionable material). The Soviet Union developed a similar program during this period to provide peaceful nuclear technology to nations in its orbit. Meanwhile, in Western Europe, EURATOM was established in 1958 to facilitate peaceful nuclear development within the European Community.

The establishment of the International Atomic Energy Agency (IAEA) in 1957 provided the institutional foundation for promoting the peaceful uses of nuclear energy and for the application of safeguards by an international organization to ensure that nuclear assistance was not being used to serve any military purpose. Inspections implemented by the United States and the Soviet Union on their own nuclear exports were taken over by the IAEA during the 1960s. The IAEA published its first set of uniform safeguards standards in 1961 (INFCIRC/26). Further refinements were devised and safeguards were extended to a broader range of nuclear activities through subsequent safeguards documents, promulgated in 1964 and 1967 (INFCIRC/66/Rev.2). The IAEA would later become the institution that verifies the NPT commitments of the NNWS.

The idea of creating a nonproliferation treaty acquired greater urgency in February 1960, when the first French nuclear weapon test was carried out in Algeria. This test raised fears of other

countries following suit. At that time, several countries were actively researching nuclear technologies, including among others, Germany, Israel, India, Italy, Japan, Sweden, and Switzerland. A driving force behind a nonproliferation treaty was the superpowers' shared interest in ensuring that West Germany, as well as other advanced industrial countries, would not develop nuclear weapons.

While the IAEA was still evolving, between 1958 and 1961, proposals at the United Nations supported the negotiation of a treaty that would prevent the further spread of nuclear weapons. These efforts culminated in the 1961 adoption (by the UN General Assembly) of a resolution sponsored by Ireland, "Prevention of the Wider Dissemination of Nuclear Weapons." It called for measures to prevent the spread of nuclear weapon technology to additional states and for all countries to desist from acquiring or transferring nuclear weapons. The impetus provided by the "Irish Resolution" led the way for the negotiation of the NPT. This resolution focused only on stopping nuclear proliferation without explicitly tying it to stopping the nuclear arms race between the United States and the Soviet Union.

The Cuban Missile Crisis of October 1962 brought the United States and the Soviet Union to the brink of a nuclear war. This crisis, as well as international pressure to halt atmospheric nuclear testing resulted in a Partial Test Ban Treaty (PTBT) negotiated by the United States, United Kingdom, and the USSR. But just two years later, in October 1964, China conducted its first nuclear test, and this event renewed international interest in devising a multinational treaty to prevent further nuclear weapon proliferation.

The Cold War between the United States and Soviet Union underscored the real possibility of nuclear war. At the same time, most of the industrially advanced NNWS formed alliance relationships giving them the benefit of a nuclear umbrella either through the U.S.-led North Atlantic Treaty Organization(NATO) or the Soviet-led Warsaw Treaty Organization (Warsaw Pact). These alliances offered an alternative to the national development of nuclear weapons, by providing nuclear defense guarantees respectively by the United States and the Soviet Union. Both superpowers deployed large numbers of nuclear weapons and delivery systems on the territories of their respective NNWS allies. Unlike the Soviet program, under which these weapons remained under the exclusive control of the USSR, several NATO NNWS, under the aegis of NATO's Nuclear Planning Group, engaged in military exercises that would allow them to deliver U.S. nuclear weapons in time of war, although the United States maintained control over the weapons in peacetime. This aspect of NATO's nuclear doctrine and planning remains controversial to this day. Some argue that the doctrine, which continued after the creation of the NPT, is contrary to Articles I and II of that treaty, which prohibit the transfer of control over nuclear weapons to any NNWS. Others contend that the exercises were training programs only and control over U.S. nuclear weapons was, in fact, never transferred to an NNWS.

Treaty on the non-proliferation of nuclear weapons (NPT)

OPENED FOR SIGNATURE: 1 JULY 1968
ENTERED INTO FORCE: 5 MARCH 1970
DEPOSITARY GOVERNMENTS: RUSSIAN FEDERATION, UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND AND UNITED STATES OF AMERICA

The States concluding this Treaty, hereinafter referred to as the Parties to the Treaty,

Considering the devastation that would be visited upon all mankind by a nuclear war and the consequent need to make every effort to avert the danger of such a war and to take measures to safeguard the security of peoples,

Believing that the proliferation of nuclear weapons would seriously enhance the danger of nuclear war,

In conformity with resolutions of the United Nations General Assembly calling for the conclusion of an agreement on the prevention of wider dissemination of nuclear weapons,

Undertaking to co-operate in facilitating the application of International Atomic Energy Agency safeguards on peaceful nuclear activities,

Expressing their support for research, development and other efforts to further the application, within the framework of the International Atomic Energy Agency safeguards system, of the principle of safeguarding effectively the flow of source and special fissionable materials by use of instruments and other techniques at certain strategic points,

Affirming the principle that the benefits of peaceful applications of nuclear technology, including any technological by-products which may be derived by nuclear-weapon States from the development of nuclear explosive devices, should be available for peaceful purposes to all Parties to the Treaty, whether nuclear-weapon or non-nuclear-weapon States,

Convinced that, in furtherance of this principle, all Parties to the Treaty are entitled to participate in the fullest possible exchange of scientific information for, and to contribute alone or in co-operation with other States to, the further development of the applications of atomic energy for peaceful purposes,

Declaring their intention to achieve at the earliest possible date the cessation of the nuclear arms race and to undertake effective measures in the direction of nuclear disarmament,

Urging the co-operation of all States in the attainment of this objective,

Recalling the determination expressed by the Parties to the 1963 Treaty banning nuclear weapons tests in the atmosphere, in outer space and under water in its Preamble to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time and to continue negotiations to this end,

Desiring to further the easing of international tension and the strengthening of trust between States in order to facilitate the cessation of the manufacture of nuclear weapons, the liquidation of all their existing stockpiles, and the elimination from national arsenals of nuclear weapons and the means of their delivery pursuant to a Treaty on general and complete disarmament under strict and effective international control,

Recalling that, in accordance with the Charter of the United Nations, States must refrain in their international relations from the threat or use of force against the territorial integrity or political independence of any State, or in any other manner inconsistent with the Purposes of the United Nations, and that the establishment and maintenance of international peace and security are to be promoted with the least diversion for armaments of the world's human and economic resources,

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Have agreed as follows:

Article I

Each nuclear-weapon State Party to the Treaty undertakes not to transfer to any recipient whatsoever nuclear weapons or other nuclear explosive devices or control over such weapons or explosive devices directly, or indirectly; and not in any way to assist, encourage, or induce any non-nuclear-weapon State to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices, or control over such weapons or explosive devices.

Article II

Each non-nuclear-weapon State Party to the Treaty undertakes not to receive the transfer from any transferor whatsoever of nuclear weapons or other nuclear explosive devices or of control over such weapons or explosive devices directly, or indirectly; not to manufacture or otherwise acquire nuclear weapons or other nuclear explosive devices; and not to seek or receive any assistance in the manufacture of nuclear weapons or other nuclear explosive devices.

Article III

1. Each non-nuclear-weapon State Party to the Treaty undertakes to accept safeguards, as set forth in an agreement to be negotiated and concluded with the International Atomic Energy Agency in accordance with the Statute of the International Atomic Energy Agency and the Agency's safeguards system, for the exclusive purpose of verification of the fulfilment of its obligations assumed under this Treaty with a view to preventing diversion of nuclear energy from peaceful uses to nuclear weapons or other nuclear explosive devices. Procedures for the safeguards required by this Article shall be followed with respect to source or special fissionable material whether it is being produced, processed or used in any principal nuclear facility or is outside any such facility. The safeguards required by this Article shall be applied on all source or special fissionable material in all peaceful nuclear activities within the territory of such State, under its jurisdiction, or carried out under its control anywhere.

2. Each State Party to the Treaty undertakes not to provide:

(a) source or special fissionable material, or

(b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.

3. The safeguards required by this Article shall be implemented in a manner designed to comply with Article IV of this Treaty, and to avoid hampering the economic or technological development of the Parties or international co-operation in the field of peaceful nuclear activities, including the international exchange of nuclear material and equipment for the processing, use or production of nuclear material for peaceful purposes in accordance with the provisions of this Article and the principle of safeguarding set forth in the Preamble of the Treaty.

4. Non-nuclear-weapon States Party to the Treaty shall conclude agreements with the International Atomic Energy Agency to meet the requirements of this Article either individually or together with other States in accordance with the Statute of the International Atomic Energy Agency. Negotiation of such agreements shall commence within 180 days from the original entry into force of this Treaty. For States depositing their instruments of ratification or accession after the 180-day period, negotiation of such agreements shall commence not later than

the date of such deposit. Such agreements shall enter into force not later than eighteen months after the date of initiation of negotiations.

Article IV

1. Nothing in this Treaty shall be interpreted as affecting the inalienable right of all the Parties to the Treaty to develop research, production and use of nuclear energy for peaceful purposes without discrimination and in conformity with Articles I and II of this Treaty.

2. All the Parties to the Treaty undertake to facilitate, and have the right to participate in, the fullest possible exchange of equipment, materials and scientific and technological information for the peaceful uses of nuclear energy. Parties to the Treaty in a position to do so shall also co-operate in contributing alone or together with other States or international organizations to the further development of the applications of nuclear energy for peaceful purposes, especially in the territories of non-nuclear-weapon States Party to the Treaty, with due consideration for the needs of the developing areas of the world.

Article V

Each Party to the Treaty undertakes to take appropriate measures to ensure that, in accordance with this Treaty, under appropriate international observation and through appropriate international procedures, potential benefits from any peaceful applications of nuclear explosions will be made available to non-nuclear-weapon States Party to the Treaty on a non-discriminatory basis and that the charge to such Parties for the explosive devices used will be as low as possible and exclude any charge for research and development. Non-nuclear-weapon States Party to the Treaty shall be able to obtain such benefits, pursuant to a special international agreement or agreements, through an appropriate international body with adequate representation of non-nuclear-weapon States. Negotiations on this subject shall commence as soon as possible after the Treaty enters into force. Non-nuclear-weapon States Party to the Treaty so desiring may also obtain such benefits pursuant to bilateral agreements.

Article VI

Each of the Parties to the Treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and to nuclear disarmament, and on a treaty on general and complete disarmament under strict and effective international control.

Article VII

Nothing in this Treaty affects the right of any group of States to conclude regional treaties in order to assure the total absence of nuclear weapons in their respective territories.

Article VIII

1. Any Party to the Treaty may propose amendments to this Treaty. The text of any proposed amendment shall be submitted to the Depositary Governments which shall circulate it to all Parties to the Treaty. Thereupon, if requested to do so by one-third or more of the Parties to the Treaty, the Depositary Governments shall convene a conference, to which they shall invite all the Parties to the Treaty, to consider such an amendment.

2. Any amendment to this Treaty must be approved by a majority of the votes of all the Parties to the Treaty, including the votes of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of

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Governors of the International Atomic Energy Agency. The amendment shall enter into force for each Party that deposits its instrument of ratification of the amendment upon the deposit of such instruments of ratification by a majority of all the Parties, including the instruments of ratification of all nuclear-weapon States Party to the Treaty and all other Parties which, on the date the amendment is circulated, are members of the Board of Governors of the International Atomic Energy Agency. Thereafter, it shall enter into force for any other Party upon the deposit of its instrument of ratification of the amendment.

3. Five years after the entry into force of this Treaty, a conference of Parties to the Treaty shall be held in Geneva, Switzerland, in order to review the operation of this Treaty with a view to assuring that the purposes of the Preamble and the provisions of the Treaty are being realised. At intervals of five years thereafter, a majority of the Parties to the Treaty may obtain, by submitting a proposal to this effect to the Depositary Governments, the convening of further conferences with the same objective of reviewing the operation of the Treaty.

Article IX

1. This Treaty shall be open to all States for signature. Any State which does not sign the Treaty before its entry into force in accordance with paragraph 3 of this Article may accede to it at any time.

2. This Treaty shall be subject to ratification by signatory States. Instruments of ratification and instruments of accession shall be deposited with the Governments of the United Kingdom of Great Britain and Northern Ireland, the Union of Soviet Socialist Republics and the United States of America, which are hereby designated the Depositary Governments.

3. This Treaty shall enter into force after its ratification by the States, the Governments of which are designated Depositaries of the Treaty, and forty other States signatory to this Treaty and the deposit of their instruments of ratification. For the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967.

4. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the date of the deposit of their instruments of ratification or accession.

5. The Depositary Governments shall promptly inform all signatory and acceding States of the date of each signature, the date of deposit of each instrument of ratification or of accession, the date of the entry into force of this Treaty, and the date of receipt of any requests for convening a conference or other notices.

6. This Treaty shall be registered by the Depositary Governments pursuant to Article 102 of the Charter of the United Nations.

Article X

1. Each Party shall in exercising its national sovereignty have the right to withdraw from the Treaty if it decides that extraordinary events, related to the subject matter of this Treaty, have jeopardized the supreme interests of its country. It shall give notice of such withdrawal to all other Parties to the Treaty and to the United Nations Security Council three months in advance. Such notice shall include a statement of the extraordinary events it regards as having jeopardized its supreme interests.

2. Twenty-five years after the entry into force of the Treaty, a conference shall be convened to decide whether the Treaty shall continue in force indefinitely, or shall be extended for an additional fixed period or periods. This decision shall be taken by a majority of the Parties to the Treaty.1

Article XI

This Treaty, the English, Russian, French, Spanish and Chinese texts of which are equally authentic, shall be deposited in the archives of the Depositary Governments. Duly certified copies of this Treaty shall be transmitted by the Depositary Governments to the Governments of the signatory and acceding States.

IN WITNESS WHEREOF the undersigned, duly authorized, have signed this Treaty.
DONE in triplicate, at the cities of London, Moscow and Washington, the first day of July, one thousand nine hundred and sixty-eight.

Note:
On 11 May 1995, in accordance with article X, paragraph 2, the Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons decided that the Treaty should continue in force indefinitely.

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Comprehensive Nuclear-Test-Ban Treaty

OPENED FOR SIGNATURE AT NEW YORK: 24 SEPTEMBER 1996
ENTERED INTO FORCE:
DEPOSITARY: SECRETARY-GENERAL OF THE UNITED NATIONS
It contains a preamble, 17 articles and a protocol with two annexes.
Here are some of its principal provisions.

PREAMBLE

The States Parties to this Treaty (hereinafter referred to as "the States Parties"),

Welcoming the international agreements and other positive measures of recent years in the field of nuclear disarmament, including reductions in arsenals of nuclear weapons, as well as in the field of the prevention of nuclear proliferation in all its aspects,

Underlining the importance of the full and prompt implementation of such agreements and measures,

Convinced that the present international situation provides an opportunity to take further effective measures towards nuclear disarmament and against the proliferation of nuclear weapons in all its aspects, and declaring their intention to take such measures,

Stressing therefore the need for continued systematic and progressive efforts to reduce nuclear weapons globally, with the ultimate goal of eliminating those weapons, and of general and complete disarmament under strict and effective international control,

Recognizing that the cessation of all nuclear weapon test explosions and all other nuclear explosions, by constraining the development and qualitative improvement of nuclear weapons and ending the development of advanced new types of nuclear weapons, constitutes an effective measure of nuclear disarmament and non-proliferation in all its aspects,

Further recognizing that an end to all such nuclear explosions will thus constitute a meaningful step in the realization of a systematic process to achieve nuclear disarmament,

Convinced that the most effective way to achieve an end to nuclear testing is through the conclusion of a universal and internationally and effectively verifiable comprehensive nuclear test-ban treaty, which has long been one of the highest priority objectives of the international community in the field of disarmament and non-proliferation,

Noting the aspirations expressed by the Parties to the 1963 Treaty Banning Nuclear Weapon Tests in the Atmosphere, in Outer Space and Under Water to seek to achieve the discontinuance of all test explosions of nuclear weapons for all time,

Noting also the views expressed that this Treaty could contribute to the protection of the environment,

Affirming the purpose of attracting the adherence of all States to this Treaty and its objective to contribute effectively to the prevention of the proliferation of nuclear weapons in all its aspects, to the process of nuclear disarmament and therefore to the enhancement of international peace and security,

Have agreed as follows:

ARTICLE I
BASIC OBLIGATIONS

1. Each State Party undertakes not to carry out any nuclear weapon test explosion or any other nuclear explosion, and to prohibit and prevent any such nuclear explosion at any place under its jurisdiction or control.

2. Each State Party undertakes, furthermore, to refrain from causing, encouraging, or in any way participating in the carrying out of any nuclear weapon test explosion or any other nuclear explosion.

ARTICLE II
THE ORGANIZATION

A. GENERAL PROVISIONS

1. The States Parties hereby establish the Comprehensive Nuclear-Test-Ban Treaty Organization (hereinafter referred to as "the Organization") to achieve the object and purpose of this Treaty, to ensure the implementation of its provisions, including those for international verification of compliance with it, and to provide a forum for consultation and cooperation among States Parties.

2. All States Parties shall be members of the Organization. A State Party shall not be deprived of its membership in the Organization.

3. The seat of the Organization shall be Vienna, Republic of Austria.

4. There are hereby established as organs of the Organization: the Conference of the States Parties, the Executive Council and the Technical Secretariat, which shall include the International Data Centre.

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B. THE CONFERENCE OF THE STATES PARTIES

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C. THE EXECUTIVE COUNCIL

Composition, Procedures and Decision-making

27. The Executive Council shall consist of 51 members. Each State Party shall have the right, in accordance with the provisions of this Article, to serve on the Executive Council.

28. Taking into account the need for equitable geographical distribution, the Executive Council shall comprise:

(a) Ten States Parties from Africa;
(b) Seven States Parties from Eastern Europe;
(c) Nine States Parties from Latin America and the Caribbean;
(d) Seven States Parties from the Middle East and South Asia;
(e) Ten States Parties from North America and Western Europe; and
(f) Eight States Parties from South-East Asia, the Pacific and the Far East.

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ARTICLE III
NATIONAL IMPLEMENTATION MEASURES

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ARTICLE IV
VERIFICATION

A. GENERAL PROVISIONS

1. In order to verify compliance with this Treaty, a verification regime shall be established consisting of the following elements:

(a) An International Monitoring System;
(b) Consultation and clarification;
(c) On-site inspections; and
(d) Confidence-building measures.

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B. THE INTERNATIONAL MONITORING SYSTEM

16. The International Monitoring System shall comprise facilities for seismological monitoring, radionuclide monitoring including certified laboratories, hydroacoustic monitoring, infrasound monitoring, and respective means of communication, and shall be supported by the International Data Centre of the Technical Secretariat.

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C. CONSULTATION AND CLARIFICATION

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D. ON-SITE INSPECTIONS

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Request for an On-Site Inspection

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Follow-up After Submission of an On-Site Inspection Request

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Executive Council Decisions

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Follow-up after Executive Council Approval of an On-Site Inspection

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The Conduct of an On-Site Inspection

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Observer

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Reports of an On-Site Inspection

. . .

Frivolous or Abusive On-Site Inspection Requests

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E. CONFIDENCE-BUILDING MEASURES

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ARTICLE V
MEASURES TO REDRESS A SITUATION AND TO ENSURE COMPLIANCE, INCLUDING SANCTIONS

. . .

ARTICLE VI
SETTLEMENT OF DISPUTES

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ARTICLE VII
AMENDMENTS

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ARTICLE VIII
REVIEW OF THE TREATY

1. Unless otherwise decided by a majority of the States Parties, ten years after the entry into force of this Treaty a Conference of the States Parties shall be held to review the operation and effectiveness of this Treaty, with a view to assuring itself that the objectives and purposes in the Preamble and the provisions of the Treaty are being realized.

. . .

ARTICLE IX
DURATION AND WITHDRAWAL

1. This Treaty shall be of unlimited duration.
2. Each State Party shall, in exercising its national sovereignty, have the right to withdraw from this Treaty if it decides that extraordinary events related to the subject matter of this Treaty have jeopardized its supreme interests.
3. Withdrawal shall be effected by giving notice six months in advance to all other States Parties, the Executive Council, the Depositary and the United Nations Security Council. Notice of withdrawal shall include a statement of the extraordinary event or events which a State Party regards as jeopardizing its supreme interests.

ARTICLE X
STATUS OF THE PROTOCOL AND THE ANNEXES

The Annexes to this Treaty, the Protocol, and the Annexes to the Protocol form an integral part of the Treaty. Any reference to this Treaty includes the Annexes to this Treaty, the Protocol and the Annexes to the Protocol.

ARTICLE XI
SIGNATURE

This Treaty shall be open to all States for signature before its entry into force.

ARTICLE XII
RATIFICATION

This Treaty shall be subject to ratification by signatory States according to their respective constitutional processes.

ARTICLE XIII
ACCESSION

Any State which does not sign this Treaty before its entry into force may accede to it at any time thereafter.

ARTICLE XIV
ENTRY INTO FORCE

1. This Treaty shall enter into force 180 days after the date of deposit of the instruments of ratification by all States listed in Annex 2 to this Treaty, but in no case earlier than two years after its opening for signature.
2. If this Treaty has not entered into force three years after the date of the anniversary of its opening for signature, the Depositary shall convene a Conference of the States that have already deposited their instruments of ratification on the request of a majority of those States. That Conference shall examine the extent to which the requirement set out in paragraph 1 has been met and shall consider and decide by consensus what measures consistent with international law may be undertaken to accelerate the ratification process in order to facilitate the early entry into force of this Treaty.
3. Unless otherwise decided by the Conference referred to in paragraph 2 or other such conferences, this process shall be repeated at subsequent anniversaries of the opening for signature of this Treaty, until its entry into force.
4. All States Signatories shall be invited to attend the Conference referred to in paragraph 2 and any subsequent conferences as referred to in paragraph 3, as observers.
5. For States whose instruments of ratification or accession are deposited subsequent to the entry into force of this Treaty, it shall enter into force on the 30th day following the date of deposit of their instruments of ratification or accession.

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ARTICLE XV
RESERVATIONS

The Articles of and the Annexes to this Treaty shall not be subject to reservations. The provisions of the Protocol to this Treaty and the Annexes to the Protocol shall not be subject to reservations incompatible with the object and purpose of this Treaty.

ARTICLE XVI
DEPOSITARY

1. The Secretary-General of the United Nations shall be the Depositary of this Treaty and shall receive signatures, instruments of ratification and instruments of accession.
2. The Depositary shall promptly inform all States Signatories and acceding States of the date of each signature, the date of deposit of each instrument of ratification or accession, the date of the entry into force of this Treaty and of any amendments and changes thereto, and the receipt of other notices.
3. The Depositary shall send duly certified copies of this Treaty to the Governments of the States Signatories and acceding States.
4. This Treaty shall be registered by the Depositary pursuant to Article 102 of the Charter of the United Nations.

ARTICLE XVII
AUTHENTIC TEXTS

This Treaty, of which the Arabic, Chinese, English, French, Russian and Spanish texts are equally authentic, shall be deposited with the Secretary-General of the United Nations.

ANNEX 1 TO THE TREATY
LIST OF STATES PURSUANT TO ARTICLE II, PARAGRAPH 28

Africa

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libyan Arab Jamahiriya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, Togo, Tunisia, Uganda, United Republic of Tanzania, Zaire, Zambia, Zimbabwe.

Eastern Europe

Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Poland, Republic of Moldova, Romania, Russian Federation, Slovakia, Slovenia, The former Yugoslav Republic of Macedonia, Ukraine, Yugoslavia.

Latin America and the Caribbean

Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela.

Middle East and South Asia

Afghanistan, Bahrain, Bangladesh, Bhutan, India, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kazakstan, Kuwait, Kyrgyzstan, Lebanon, Maldives, Oman, Nepal, Pakistan, Qatar, Sau-

di Arabia, Sri Lanka, Syrian Arab Republic, Tajikistan, Turkmenistan, United Arab Emirates, Uzbekistan, Yemen.

North America and Western Europe

Andorra, Austria, Belgium, Canada, Cyprus, Denmark, Finland, France, Germany, Greece, Holy See, Iceland, Ireland, Italy, Liechtenstein, Luxembourg, Malta, Monaco, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, Turkey, United Kingdom of Great Britain and Northern Ireland, United States of America.

South East Asia, the Pacific and the Far East

Australia, Brunei Darussalam, Cambodia, China, Cook Islands, Democratic People's Republic of Korea, Fiji, Indonesia, Japan, Kiribati, Lao People's Democratic Republic, Malaysia, Marshall Islands, Micronesia (Federated States of), Mongolia, Myanmar, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Republic of Korea, Samoa, Singapore, Solomon Islands, Thailand, Tonga, Tuvalu, Vanuatu, Viet Nam.

ANNEX 2 TO THE TREATY
LIST OF STATES PURSUANT TO ARTICLE XIV

List of States members of the Conference on Disarmament as at 18 June 1996 which formally participated in the work of the 1996 session of the Conference and which appear in Table 1 of the International Atomic Energy Agency's April 1996 edition of "Nuclear Power Reactors in the World", and of States members of the Conference on Disarmament as at 18 June 1996 which formally participated in the work of the 1996 session of the Conference and which appear in Table 1 of the International Atomic Energy Agency's December 1995 edition of "Nuclear Research Reactors in the World":

Algeria, Argentina, Australia, Austria, Bangladesh, Belgium, Brazil, Bulgaria, Canada, Chile, China, Colombia, Democratic People's Republic of Korea, Egypt, Finland, France, Germany, Hungary, India, Indonesia, Iran (Islamic Republic of), Israel, Italy, Japan, Mexico, Netherlands, Norway, Pakistan, Peru, Poland, Romania, Republic of Korea, Russian Federation, Slovakia, South Africa, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, United States of America, Viet Nam, Zaire.

PROTOCOL TO THE COMPREHENSIVE NUCLEAR TEST-BAN TREATY

PART I

THE INTERNATIONAL MONITORING SYSTEM AND INTERNATIONAL DATA CENTRE FUNCTIONS

A. GENERAL PROVISIONS

. . .

B. SEISMOLOGICAL MONITORING

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C. RADIONUCLIDE MONITORING

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D. HYDROACOUSTIC MONITORING

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E. INFRASOUND MONITORING

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F. INTERNATIONAL DATA CENTRE FUNCTIONS

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16. The International Data Centre shall receive, collect, process, analyse, report on and archive data from International Monitoring System facilities, including the results of analysis conducted at certified laboratories.

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International Data Centre Standard Products

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International Data Centre Services to States Parties

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National Event Screening

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Technical Assistance

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PART II

ON-SITE INSPECTIONS

A. GENERAL PROVISIONS

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B. STANDING ARRANGEMENTS

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C. ON-SITE INSPECTION REQUEST, INSPECTION MANDATE AND NOTIFICATION OF INSPECTION

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D. PRE-INSPECTION ACTIVITIES

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E. CONDUCT OF INSPECTIONS

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PART III

CONFIDENCE-BUILDING MEASURES

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U.S. Accidentally Releases List of Nuclear Sites

By WILLIAM J. BROAD
The New York Times
Published: June 2, 2009

The federal government mistakenly made public a 266-page report, its pages marked "highly confidential," that gives detailed information about hundreds of the nation's civilian nuclear sites and programs, including maps showing the precise locations of stockpiles of fuel for nuclear weapons.

The publication of the document was revealed Monday in an online newsletter devoted to issues of federal secrecy. That set off a debate among nuclear experts about what dangers, if any, the disclosures posed. It also prompted a flurry of investigations in Washington into why the document had been made public.

On Tuesday evening, after inquiries from The New York Times, the document was withdrawn from a Government Printing Office Web site.

Several nuclear experts argued that any dangers from the disclosure were minimal, given that the general outlines of the most sensitive information were already known publicly.

"These screw-ups happen," said John M. Deutch, a former director of central intelligence and deputy secretary of defense who is now a professor at the Massachusetts Institute of Technology. "It's going further than I would have gone but doesn't look like a serious breach."

But David Albright, president of the Institute for Science and International Security, a private group in Washington that tracks nuclear proliferation, said information that shows where nuclear fuels are stored "can provide thieves or terrorists inside information that can help them seize the material, which is why that kind of data is not given out."

The information, considered confidential but not classified, was assembled for transmission later this year to the International Atomic Energy Agency as part of a process by which the United States is opening itself up to stricter inspections in hopes that foreign countries, especially Iran and others believed to be clandestinely developing nuclear arms, will do likewise.

President Obama sent the document to Congress on May 5 for Congressional review and possible revision, and the Government Printing Office subsequently posted the draft declaration on its Web site.

As of Tuesday evening, the reasons for that action remained a mystery. On its cover, the document attributes its publication to the House Committee on Foreign Affairs. But Lynne Weil, the committee spokeswoman, said the committee had "neither published it nor had control over its publication."

Gary Somerset, a spokesman for the printing office, said it had "produced" the document "under normal operating procedures" but had now removed it from its Web site pending further review.

The document contains no military information about the nation's stockpile of nuclear arms, or about the facilities and programs that guard such weapons. Rather, it presents what appears to be an exhaustive listing of the sites that make up the nation's civilian nuclear complex, which stretches coast to coast and includes nuclear reactors and highly confidential sites at weapon laboratories.

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Steven Aftergood, a security expert at the Federation of American Scientists in Washington, revealed the existence of the document on Monday in Secrecy News, an electronic newsletter he publishes on the Web.

Mr. Aftergood expressed bafflement at its disclosure, calling it "a one-stop shop for information on U.S. nuclear programs."

In his letter of transmittal to Congress, Mr. Obama characterized the information as "sensitive but unclassified" and said all the information that the United States gathered to comply with the advanced protocol "shall be exempt from disclosure" under the Freedom of Information Act.

The report details the locations of hundreds of nuclear sites and activities. Each page is marked across the top "Highly Confidential Safeguards Sensitive" in capital letters, with the exception of pages that detailed additional information like site maps. In his transmittal letter, Mr. Obama said the cautionary language was a classification category of the International Atomic Energy Agency's inspectors.

The agency, in Vienna, is a unit of the United Nations whose mandate is to enforce a global treaty that tries to keep civilian nuclear programs from engaging in secret military work.

In recent years, it has sought to gain wide adherence to a set of strict inspection rules, known formally as the additional protocol. The rules give the agency powerful new rights to poke its nose beyond known nuclear sites into factories, storage areas, laboratories and anywhere else that a nation might be preparing to flex its nuclear muscle. The United States signed the agreement in 1998 but only recently moved forward with carrying it out.

The report lists many particulars about nuclear programs and facilities at the nation's three nuclear weapons laboratories — Los Alamos, Livermore and Sandia — as well as dozens of other federal and private nuclear sites.

One of the most serious disclosures appears to center on the Oak Ridge National Laboratory in Tennessee, which houses the Y-12 National Security Complex, a sprawling site ringed by barbed wire and armed guards. It calls itself the nation's Fort Knox for highly enriched uranium, a main fuel of nuclear arms.

The report lists "Tube Vault 16, East Storage Array," as a prospective site for nuclear inspection. It said the site, in Building 9720-5, contains highly enriched uranium for "long-term storage."

An attached map shows the exact location of Tube Vault 16 along a hallway and its orientation in relation to geographic north, although not its location in the Y-12 complex.

Tube vaults are typically cylinders embedded in concrete that prevent the accidental formation of critical masses of highly enriched uranium that could undergo bursts of nuclear fission, known as a criticality incident. According to federal reports, a typical tube vault can hold up to 44 tons of highly enriched uranium in 200 tubes. Motion detectors and television cameras typically monitor each vault.

Thomas B. Cochran, a senior scientist in the nuclear program of the Natural Resources Defense Council, a private group in Washington that tracks atomic arsenals, called the document harmless. "It's a better listing than anything I've seen" of the nation's civilian nuclear complex, Mr. Cochran said. "But it's no national-security breach. It confirms what's already out there and adds a bit more information."

The National Ignition Facility

On target, finally

May 28th 2009

From *The Economist* print edition

A machine for testing nuclear weapons opens for business

WHAT do you get when you focus 192 lasers onto a pellet the size of a match head and press the "fire" button? The answer, hope physicists at the National Ignition Facility (NIF) in Livermore, California, is: the most powerful machine on the planet. The NIF, which is scheduled to go into operation on May 29th, is designed to create conditions like those found in stars—and also in the explosions of hydrogen bombs. To do that requires, for the brief instants when it is operating at full tilt (a total of three thousandths of a second a year), that it has a power of 500 trillion watts, about 3,000 times the average electricity consumption of the whole of planet Earth.

The pellets at which this energy is directed are made of frozen hydrogen. The aim is to make those pellets undergo nuclear fusion—the process that causes stars to shine and hydrogen bombs to explode. Although the justification for building the NIF has changed over the years (originally there was talk of it being a prototype for fusion-based power stations), it is the resemblance to bombs which has saved the project from the budgetary chop. For the NIF provides America with a way to carry out nuclear-weapons tests without actually testing any weapons.

Had the NIF been a purely scientific project, it would almost certainly have been cancelled. It has cost $4 billion so far, almost four times the original estimate, and is running more than five years behind schedule. Construction started in May 1997 but the initial design proved impractical and was sent back to the drawing board. In 2000 the Department of Energy, which is responsible for the Lawrence Livermore National Laboratory, the NIF's host, altered the design and revised its budget and deadlines. And in July 2005 Congress actually voted to suspend construction of the machine—relenting only when extra money was found to compensate for cost overruns that had threatened to penalise the work of two other energy-department laboratories that drew their cash from the same pot.

Testing, testing

What ultimately saved the NIF from cancellation was that its backers persuaded politicians it was vital to the "stockpile stewardship" programme for America's nuclear bombs. Although America has not ratified the Comprehensive Test-Ban Treaty, it suspended the testing of its nuclear weapons in 1992. Instead of weapons development, nuclear-weapons scientists are now engaged in a programme intended to ensure that the country's existing warheads will continue to function predictably as they age. This work uses "subcritical" tests that do not involve full nuclear detonations, and computer simulations of how a weapon would explode.

Such simulations are all well and good, but they must, from time to time, be tested against the real world. That is where the NIF comes in. It will, if it works, create real nuclear explosions, not subcritical phuts. These explosions will be too small to count as nuclear tests within the meaning of the treaty (which America tries to abide by, even though it has not signed). They will, however, be big enough to yield information useful to nuclear-weapons scientists.

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Each laser pulse will begin as a weak infra-red beam. This is split into 48 daughter beams that are then fed into preamplifiers which increase their power 20 billion times. Each of the daughters is split further, into four, and passed repeatedly through the main amplifiers. These increase the beams' power 15,000 times and push their wavelengths into the ultraviolet.

The pellet itself contains a sphere of deuterium (a heavy form of hydrogen, with nuclei consisting of a proton and a neutron) and tritium (even heavier hydrogen, with a proton and two neutrons) that is chilled to just a degree or so above absolute zero. The beams should compress the sphere so rapidly that it implodes, squeezing deuterium and tritium nuclei together until they overcome their mutual repulsion and fuse to form helium (two protons and two neutrons) together with a surplus neutron and a lot of heat. If enough heat is generated it will sustain the process of fusion without laser input, until most of the nuclear fuel has been used up.

Physicists hope that in the coming year or so the NIF will become the first machine to achieve a nuclear-fusion reaction that produces more energy than it takes to ignite, albeit for only a fraction of a second. Sceptics reckon that the machine may not be capable of such a feat. Creating a sustained nuclear-fusion reaction that could generate power is the goal of another mammoth experiment, the International Experimental Thermonuclear Reactor, which is being built in Cadarache, France. Plenty of people are sceptical about the likely success of that project, too. Like the NIF, it appears to be slipping behind schedule. Full experiments to test nuclear fusion as a power source seem likely to be delayed until 2025.

If the NIF does work, the bomb-scientists will be ecstatic. Astrophysicists will be pretty pleased, too. Although they will get only about 200 of the annual budget of between 700 and 1,000 runs, they will be able to use their time on the machine to simulate the interiors of giant planets, stars and exploding supernovae, by varying the compositions of the pellets to match what they think those things are made of. Bombs or no bombs, astronomy will start to move from being an observational to an experimental science. At a mere $140m a year, then, the NIF is a snip.

Atoms for Peace

This address was given by Dwight D. Eisenhower before the General Assembly of the United Nations on Peaceful Uses of Atomic Energy, New York City, December 8, 1953.

Madame President, Members of the General Assembly:

When Secretary General Hammarskjold's invitation to address this General Assembly reached me in Bermuda, I was just beginning a series of conferences with the Prime Ministers and Foreign Ministers of Great Britain and of France. Our subject was some of the problems that beset our world.

During the remainder of the Bermuda Conference, I had constantly in mind that ahead of me lay a great honor. That honor is mine today as I stand here, Privileged to address the General Assembly of the United Nations.

At the same time that I appreciate the distinction of addressing you, I have a sense of exhilaration as I look upon this Assembly.

Never before in history has so much hope for so many people been gathered together in a single organization. Your deliberations and decisions during these somber years have already realized part of those hopes.

But the great test and the great accomplishments still lie ahead. And in the confident expectation of those accomplishments, I would use the office which, for the time being, I hold, to assure you that the Government of the United States will remain steadfast in its support of this body. This we shall do in the conviction that you will provide a great share of the wisdom, the courage, and the faith which can bring to this world lasting peace for all nations, and happiness and well-being for all men.

Clearly, it would not be fitting for me to take this occasion to present to you a unilateral American report on Bermuda. Nevertheless, I assure you that in our deliberations on that lovely island we sought to invoke those same great concepts of universal peace and human dignity which are so clearly etched in your Charter.

Neither would it be a measure of this great opportunity merely to recite, however hopefully, pious platitudes.

I therefore decided that this occasion warranted my saying to you some of the things that have been on the minds and hearts of my legislative and executive associates and on mine for a great many months-thoughts I had originally planned to say primarily to the American people.

I know that the American people share my deep belief that if a danger exists in the world, it is a danger shared by all--and equally, that if hope exists in the mind of one nation, that hope should be shared by all.

Finally, if there is to be advanced any proposal designed to ease even by the smallest measure the tensions of today's world, what more appropriate audience could there be than the members of the General Assembly of the United Nations?

I feel impelled to speak today in a language that in a sense is new--one which I, who have spent so much of my life in the military profession, would have preferred never to use.

That new language is the language of atomic warfare.

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The atomic age has moved forward at such a pace that every citizen of the world should have some comprehension, at least in comparative terms, of the extent of this development of the utmost significance to every one of us. Clearly, if the people of the world are to conduct an intelligent search for peace, they must be armed with the significant facts of today's existence.

My recital of atomic danger and power is necessarily stated in United States terms, for these are the only in controvertible facts that I know. I need hardly point out to this Assembly, however, that this subject is global, not merely national in character.

On July 16, 1945, the United States set off the world's first atomic explosion. Since that date in 1945, the United States of America has conducted 42 test explosions.

Atomic bombs today are more than 25 times as powerful as the weapons with which the atomic age dawned, while hydrogen weapons are in the ranges of millions of tons of TNT equivalent.

Today, the United States' stockpile of atomic weapons, which, of course, increases daily, exceeds by many times the explosive equivalent of the total of all bombs and all shells that came from every plane and every gun in every theatre of war in all of the years of World War II.

A single air group, whether afloat or land-based, can now deliver to any reachable target a destructive cargo exceeding in power all the bombs that fell on Britain in all of World War II.

In size and variety, the development of atomic weapons has been no less remarkable. The development has been such that atomic weapons have virtually achieved conventional status within our armed services. In the United States, the Army, the Navy, the Air Force, and the Marine Corps are all capable of putting this weapon to military use.

But the dread secret, and the fearful engines of atomic might, are not ours alone.

In the first place, the secret is possessed by our friends and allies, Great Britain and Canada, whose scientific genius made a tremendous contribution to our original discoveries, and the designs of atomic bombs.

The secret is also known by the Soviet Union.

The Soviet Union has informed us that, over recent years, it has devoted extensive resources to atomic weapons. During this period, the Soviet Union has exploded a series of atomic devices, including at least one involving thermo-nuclear reactions.

If at one time the United States possessed what might have been called a monopoly of atomic power, that monopoly ceased to exist several years ago. Therefore, although our earlier start has permitted us to accumulate what is today a great quantitative advantage, the atomic realities of today comprehend two facts of even greater significance.

First, the knowledge now possessed by several nations will eventually be shared by others--possibly all others.

Second, even a vast superiority in numbers of weapons, and a consequent capability of devastating retaliation, is no preventive, of itself, against the fearful material damage and toll of human lives that would be inflicted by surprise aggression.

The free world, at least dimly aware of these facts, has naturally embarked on a large program of warning and defense systems. That program will be accelerated and expanded.

But let no one think that the expenditure of vast sums for weapons and systems of defense can guarantee absolute safety for the cities and citizens of any nation. The awful arithmetic of the atomic bomb does not permit any such easy solution. Even against the most powerful defense,

an aggressor in possession of the effective minimum number of atomic bombs for a surprise attack could probably place a sufficient number of his bombs on the chosen targets to cause hideous damage.

Should such an atomic attack be launched against the United States, our reactions would be swift and resolute. But for me to say that the defense capabilities of the United States are such that they could inflict terrible losses upon an aggressor--for me to say that the retaliation capabilities of the United States are so great that such an aggressor's land would be laid waste--all this, while fact, is not the true expression of the purpose and the hope of the United States.

To pause there would be to confirm the hopeless finality of a belief that two atomic colossi are doomed malevolently to eye each other indefinitely across a trembling world. To stop there would be to accept helplessly the probability of civilization destroyed--the annihilation of the irreplaceable heritage of mankind handed down to us generation from generation--and the condemnation of mankind to begin all over again the age-old struggle upward from savagery toward decency, and right, and justice.

Surely no sane member of the human race could discover victory in such desolation. Could anyone wish his name to be coupled by history with such human degradation and destruction?

Occasional pages of history do record the faces of the "Great Destroyers" but the whole book of history reveals mankind's never-ending quest for peace, and mankind's God-given capacity to build.

It is with the book of history, and not with isolated pages, that the United States will ever wish to be identified. My country wants to be constructive, not destructive. It wants agreement, not wars, among nations. It wants itself to live in freedom, and in the confidence that the people of every other nation enjoy equally the right of choosing their own way of life.

So my country's purpose is to help us move out of the dark chamber of horrors into the light, to find a way by which the minds of men, the hopes of men, the souls of men every where, can move forward toward peace and happiness and well being.

In this quest, I know that we must not lack patience.

I know that in a world divided, such as our today, salvation cannot be attained by one dramatic act.

I know that many steps will have to be taken over many months before the world can look at itself one day and truly realize that a new climate of mutually peaceful confidence is abroad in the world.

But I know, above all else, that we much start to take these steps--now.

The United States and its allies, Great Britain and France, have over the past months tried to take some of these steps. Let no one say that we shun the conference table.

On the record has long stood the request of the United States, Great Britain, and France to negotiate with the Soviet Union the problems of a divided Germany.

On that record has long stood the request of the same three nations to negotiate the problems of Korea.

Most recently, we have received from the Soviet Union what is in effect an expression of willingness to hold a Four Power meeting. Along with our allies, Great Britain and France, we were pleased to see that this note did not contain the unacceptable preconditions previously put forward.

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As you already know from our joint Bermuda communiqué, the United States, Great Britain, and France have agreed promptly to meet with the Soviet Union.

The Government of the United States approaches this conference with hopeful sincerity. We will bend every effort of our minds to the single purpose of emerging from that conference with tangible results toward peace--the only true way of lessening international tension.

We never have, we never will, propose or suggest that the Soviet Union surrender what is rightfully theirs.

We will never say that the people of Russia are an enemy with whom we have no desire ever to deal or mingle in friendly and fruitful relationship.

On the contrary, we hope that this coming Conference may initiate a relationship with the Soviet Union which will eventually bring about a free inter mingling of the peoples of the east and of the west--the one sure, human way of developing the understanding required for confident and peaceful relations.

Instead of the discontent which is now settling upon Eastern Germany, occupied Austria, and countries of Eastern Europe, we seek a harmonious family of free European nations, with none a threat to the other, and least of all a threat to the peoples of Russia.

Beyond the turmoil and strife and misery of Asia, we seek peaceful opportunity for these peoples to develop their natural resources and to elevate their lives.

These are not idle works or shallow visions. Behind them lies a story of nations lately come to independence, not as a result of war, but through free grant or peaceful negotiation. There is a record, already written, of assistance gladly given by nations of the west to needy peoples, and to those suffering the temporary effects of famine, drought, and natural disaster.

These are deeds of peace. They speak more loudly than promises or protestations of peaceful intent.

But I do not wish to rest either upon the reiteration of past proposals or the restatement of past deeds. The gravity of the time is such that every new avenue of peace, no matter how dimly discernible, should be explored.

These is at least one new avenue of peace which has not yet been well explored--an avenue now laid out by the General Assembly of the United Nations.

In its resolution of November 18th, 1953 this General Assembly suggested--and I quote--"that the Disarmament Commission study the desirability of establishing a sub-committee consisting of representatives of the Powers principally involved, which should seek in private an acceptable solution . . . and report on such a solution to the General Assembly and to the Security Council not later than 1 September 1954."

The United States, heeding the suggestion of the General Assembly of the United Nations, is instantly prepared to meet privately with such other countries as may be "principally involved," to seek "an acceptable solution" to the atomic armaments race which over shadows not only the peace, but the very life, of the world.

We shall carry into these private or diplomatic talks a new conception.

The United States would seek more than the mere reduction or elimination of atomic materials for military purposes.

It is not enough to take this weapon out of the hands of the soldiers. It must be put into the hands of those who will know how to strip its military casing and adapt it to the arts of peace.

The United States knows that if the fearful trend of atomic military build up can be reversed, this greatest of destructive forces can be developed into a great boon, for the benefit of all mankind.

The United States knows that peaceful power from atomic energy is no dream of the future. That capability, already proved, is here--now--today. Who can doubt, if the entire body of the world's scientists and engineers had adequate amounts of fissionable material with which to test and develop their ideas, that this capability would rapidly be transformed into universal, efficient, and economic usage.

To hasten the day when fear of the atom will begin to disappear from the minds of people, and the governments of the East and West, there are certain steps that can be taken now.

I therefore make the following proposals:

The Governments principally involved, to the extent permitted by elementary prudence, to begin now and continue to make joint contributions from their stockpiles of normal uranium and fissionable materials to an international Atomic Energy Agency. We would expect that such an agency would be set up under the aegis of the United Nations.

The ratios of contributions, the procedures and other details would properly be within the scope of the "private conversations" I have referred to earlier.

The United States is prepared to under take these explorations in good faith. Any partner of the United States acting in the same good faith will find the United States a not unreasonable or ungenerous associate.

Undoubtedly initial and early contributions to this plan would be small in quantity. However, the proposal has the great virtue that it can be under taken without the irritations and mutual suspicions incident to any attempt to set up a completely acceptable system of world-wide inspection and control.

The Atomic Energy Agency could be made responsible for the impounding, storage, and protection of the contributed fissionable and other materials. The ingenuity of our scientists will provide special safe conditions under which such a bank of fissionable material can be made essentially immune to surprise seizure.

The more important responsibility of this Atomic Energy Agency would be to devise methods where by this fissionable material would be allocated to serve the peaceful pursuits of mankind. Experts would be mobilized to apply atomic energy to the needs of agriculture, medicine, and other peaceful activities. A special purpose would be to provide abundant electrical energy in the power-starved areas of the world. Thus the contributing powers would be dedicating some of their strength to serve the needs rather than the fears of mankind.

The United States would be more than willing--it would be proud to take up with others "principally involved: the development of plans where by such peaceful use of atomic energy would be expedited.

Of those "principally involved" the Soviet Union must, of course, be one.

I would be prepared to submit to the Congress of the United States, and with every expectation of approval, any such plan that would:

First--encourage world-wide investigation into the most effective peace time uses of fissionable material, and with the certainty that they had all the material needed for the conduct of all experiments that were appropriate;

Second--begin to diminish the potential destructive power of the world's atomic stockpiles;

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Third--allow all peoples of all nations to see that, in this enlightened age, the great powers of the earth, both of the East and of the West, are interested in human aspirations first, rather than in building up the armaments of war;

Fourth--open up a new channel for peaceful discussion, and initiate at least a new approach to the many difficult problems that must be solved in both private and public conversations, if the world is to shake off the inertia imposed by fear, and is to make positive progress toward peace.

Against the dark background of the atomic bomb, the United Stats does not wish merely to present strength, but also the desire and the hope for peace.

The coming months will be fraught with fateful decisions. In this Assembly; in the capitals and military headquarters of the world; in the hearts of men every where, be they governors, or governed, may they be decisions which will lead this work out of fear and into peace.

To the making of these fateful decisions, the United States pledges before you--and therefore before the world--its determination to help solve the fearful atomic dilemma--to devote its entire heart and mind to find the way by which the miraculous inventiveness of man shall not be dedicated to his death, but consecrated to his life.

I again thank the delegates for the great honor they have done me, in inviting me to appear before them, and in listening to me so courteously. Thank you.

DOUBLE-TALK OR DOUBLE-THINK?[1]

A COMMENT ON THE DRAFT NON-PROLIFERATION TREATY

By David Vital[2]

After three years of labour the Eighteen Nation Disarmament Committee at Geneva has brought out its final and agreed draft of a treaty on the non-proliferation of nuclear weapons and has submitted it to the United Nations General Assembly. The Assembly, in turn, debated and approved the draft in its current session. It is expected that the draft treaty will soon be open for signature and — so the optimists confidently tell us — it may even be operative by the end of 1968. Had it been rejected, then, in principle, it would have had to be returned to the ENDC for further discussion and amendment.

In practice, however, this was never likely to occur. The draft that emerged from the Geneva talks was in all essential respects a Russo-American product (marginally adjusted to meet the criticisms and protestations of those lesser Powers which have been bold and concerned enough to speak out) and carries the full weight of Russian and American support. As such, it represents a triumph of long and patient negotiation; even if the central weaknesses of the proposed treaty (those with which this article is concerned) have not been catered for by anything better than verbal formulae, it is entirely understandable that the promoters of the scheme should have dreaded the prospect of returning to Geneva for more talks. But in any case the issues raised by the objections and counter-objections to the non-proliferation treaty (henceforth referred to as the NPT) cut so near the bone of the contemporary international politico-military system that it was, on any grounds, hard to believe that the draft treaty could be further and radically amended without corresponding changes in the system itself. And so, from the first, loud whispers were to be heard to the effect that the draft in whole or in essential part was not negotiable; and there are all the signs that the hesitant will continue to be subjected to a great deal of quiet arm-twisting until the treaty has been signed and ratified. In short, it would be entirely reasonable, on present showing, to predict that the NPT will duly come into force before very long — if not this year, then sometime in the next.

The NPT does, without any doubt, represent progress of a kind in an extremely difficult field of international relations. Accordingly, it is always possible and, perhaps, tempting to say, with Mr. Fred Mulley, that 'we must not allow the best to become the enemy of the good'[3] by asking for something better. Equally, it is possible to take refuge in the oldest, superficially most persuasive, and yet perhaps most insidious of all snap diplomatic judgments: proclaim the NPT in its latest form a *fait accompli,* dismiss it thereupon from one's mental horizon and go on to other things. And yet it ought to be evident that in the case of this particular subject we really cannot afford to take the easy, 'pragmatic' way out. The proposed non-proliferation treaty, this article contends, will not deal with, still less settle, the great issues with which it is nominally concerned, nor does it hold out any reasonable prospect of so doing. And to that extent and, more particularly, because it is liable to mislead public opinion and postpone and divert pressure for change, it may well be thought liable to do a great deal more

[1] Al abrirse a la firma el TNP, apareció este artículo en *International Affairs: A Quarterly Review (*Royal Institute of International Affairs, Oxford University Press, Vol. 44, July 1968, No. 3, pp. 419-433).

[2] Lecturer in International Relations at the University of Sussex for the past two years, was recently appointed Associate Professor of Political Science at Bar-Ilan University, Israel. Author of: 'The Inequality of States: A Study of the Small Power in International Relations'.

[3] Statement at the ENDC, January 23, 1968.

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harm than good. The complacency, not to say humbug, which has characterised so much of the talk at Geneva, and the publicity emanating from it, have made a reasoned discussion of the subject extraordinarily difficult. Yet that is not to say that the effort to look at the matter of the NPT yet again should not be made.

* * *

The draft non-proliferation treaty is not a complicated document, but nor is it a particularly straightforward one. Its key — but yet only implicit — provision is the division of the international community into two classes of states: those termed 'Nuclear-Weapon States'[4] and those termed 'Non-Nuclear Weapon States'. And, as is well known, the treaty's principal business is to maintain the present membership of the two classes unchanged. It could certainly be argued that both classes will, in practice, be formed of two sub-classes: those which are and those which are not signatories of the NPT. But a crude distinction into two classes alone will suffice for present purposes.

Erosion of the boundary between the classes is to be inhibited or forestalled by an undertaking on the part of the members of class A to keep nuclear weapons and techniques and materials relevant to their production out of the hands of the members of class B. And this provision is to be reinforced by the corresponding undertaking by members of class B not to acquire or manufacture such weapons and explosive devices, nor to seek to do so. Finally, the members of class B (and class B alone) will submit to 'safeguards' — i.e., to periodic and systematic verification by the International Atomic Energy Agency that they are indeed fulfilling their undertaking.

The 'safeguards' issue is one which has been heatedly and openly discussed. This is partly because the IAEA is not regarded with universal affection, and the prospect of its inspectors poking about in the commercially sensitive field of nuclear energy production for peaceful uses has inevitably raised the spectre of industrial espionage. It is also partly because there has been much fear that in one way or another the system would work to the commercial, no less than military, benefit of the members of class A and class A alone. In this respect the latest draft of the treaty is generally believed to be an improvement over previous drafts, and pressure for change in this direction is now much reduced — except perhaps in connection with the peaceful uses of nuclear explosives, e.g., in large-scale civil engineering works. Since the production of nuclear explosives for civil purposes cannot, of course, be effectively distinguished from production for military purposes, the effect of the NPT here will undoubtedly be, as the Brazilians in particular have pointed out, to impose 'the institutionalisation of a status of dependence' of class B on class A for at least a quarter of a century 'regardless of any technological breakthrough that might occur during those years'.[5]

But the crux of the matter of the treaty is to be found in its military implications. It specifically envisages one class of states which will continue to be governed by political and military leaders who believe they require nuclear weapons and who do in fact possess them, and a second class of states which do not, and are not, to possess them regardless of what they believe (or come to believe) to be necessary for national security. Alternatively, if, after adhering to the treaty, they decide that 'extraordinary events . . . have jeopardised the supreme interests 'of

[4] Defined as those states which have 'manufactured and exploded a nuclear-weapon or other nuclear explosiva device prior to January 1, 1967' (Article IX**,** para. 3).

[5] Statement by Ambassador J. A. de Araujo Castro, February 8, 1968.

their country they may withdraw[6] and, in principle, go nuclear. But in view of the immense pressure that would immediately be focused on a state contemplating withdrawal, to say nothing of the strategic implications for that state of enduring the lapse of time that would necessarily ensue between, on the one hand, the decision to withdraw and the concomitant escape from 'safeguards' and, on the other hand, the day when home-made nuclear devices first become available and operational, it is hard to envisage a situation in which a class B state could in fact afford to withdraw. Certainly, the political and military consequences of so doing would hardly be distinguishable from those attendant on the actual acquisition and deployment of nuclear weapons. It is considerations of this order that largely account for the dislike in which the proposed NPT is held by those states — most notably India which, while by no means yet resolved on the production of nuclear weapons, are nonetheless capable both of producing them *and* of contemplating their active deployment for much the same deterrent purposes that form the theoretical basis of their production and deployment by the existing nuclear weapon states.

Broadly speaking, the line taken by proponents of the NPT has been to argue that the politico-military benefits accruing from the possession of nuclear weapons are illusory, and that the arguments against their acquisition are compelling. It is, indeed, widely understood today that even a second or third class nuclear capability is hideously expensive — and that successive generations of delivery systems are almost invariably more expensive than the bombs themselves.

It is equally clear that the once popular theory that tactical weapons (intended to do no more than stop an opponent's preponderant conventional forces) constitute the contemporary answer to the small or middle Power's problem of how to maintain neutrality and/or security in a dangerous world is itself hardly tenable, and that the distinction between tactical and strategic *uses* of nuclear weapons (as opposed to their nominal technical characteristics) is an unreal one. It is impossible to believe, for example, that once the threshold between the employment of nuclear and conventional forces has been crossed the first class nuclear Power will refrain from making full use of its nuclear preponderance if that be the condition of success. Again, the mere possession of nuclear weapons, even by a convinced and convincing neutral, seems only too likely to lead straight to that country's inclusion in the target lists of the other (and major) nuclear Powers.

Finally, it is abundantly clear that it is, above all, the possession of nuclear weapons by X that impels Y to go along the same route (a point to which further reference will be made), and that if Y does acquire them it, in turn, may be confronted by a newly nuclear Z as well. To cite the most obvious instance of this commonplace: India's prime cause for considering the nuclear option is the possession of nuclear — and, of course, of preponderant conventional — forces by China. But if India were to follow China in going nuclear she might be followed in turn by a nuclear Pakistan. Indian leaders must, and assuredly do, bear that grim possibility in mind.

All this, and more, is well understood. And there can be very little doubt that it is awareness of these difficulties that lies behind the plain fact that, despite the absence of a signed and ratified NPT, there are still no more than five nuclear Powers today. Nor is there the slightest evidence to indicate that any one of the states commonly included in the lists of 'potential nuclear Powers' actively proposes to move on from its present condition of having the scientific

[6] 4 Article X, para. 1.

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and technological *capability* to produce nuclear weapons within, say, two, or five, or ten years of the decision to do so, to the point of actually producing them. In other words, the function of the NPT is not at all the damming of an impending flood of fresh, third-rate entrants into the nuclear club. No such flood, or even trickle, is imminent. Its central purpose is effectively to withdraw from the potential (military) nuclear Powers the ultimate *option* of going nuclear in the unspecified future. And, like most other formal international agreements, it proposes to do so by arresting the processes of change — in this case political, strategic and technological.

The first question to be asked, therefore, is whether, and to what extent, it does promise to inhibit, if not prevent, the further proliferation of nuclear weapons in the face of such counter-pressures as it is reasonable to envisage. This in turn depends on an assessment of the counter-pressures. But the NPT must surely also be judged in the light of the principle laid down by the General Assembly in 1965, namely that

> The Treaty should be a step towards the achievement of general and complete disarmament and, more particularly, nuclear disarmament.[7]

The two criteria are, in fact, closely connected.

* * *

Who are the potential military nuclear Powers? Following the late Sir John Cockcroft, and judging, crudely, by probable annual output of weapons-grade plutonium in 1970, they are: Belgium (2 kg.), Canada (650 kg.), Czechoslovakia (75 kg.), West Germany (235 kg.), India (190 kg.), Israel (5 kg.), Italy (160 kg.), Japan (300 kg.), the Netherlands (10 kg.), Pakistan (60 kg.), Spain (120 kg.), Sweden (120 kg.), Switzerland (70 kg.).[8] A recent UN study of the question has 'estimated that some eight kilograms of [weapons-grade plutonium] would be needed for a nuclear warhead yielding a twenty-kiloton explosion'.[9] On these grounds the serious contenders (if that is what they are) must be among the following: Canada, Czechoslovakia, West Germany, India, Italy, Japan, Pakistan, Spain, Sweden, and Switzerland.

The case of Pakistan apart, it should be immediately evident that the only politico-strategic contexts in which the taking up of nuclear options by these particular states would make even minimal sense are two:

a. the contingency of military confrontation with one of the existing nuclear Powers;

b. the adoption of an entirely independent political and strategic policy on the model of the current French *tous azimuts — or,* in alternative terms, the attempt to establish an additional centre or 'pole' of world power.

It is the first context that is really critical. Only Japan and, perhaps, Western Germany would be capable of attempting, though not necessarily attaining, the latter goal; and in any case the force and implications of the second context may in all essentials be reduced to those of the first, which involves the following suppositions: first, that conflict with a class A (nuclear) state is not impossible; second, that in the event of such conflict it is unlikely that a class B (non-nuclear) state will be fully supported by any of the other members of class A, and third, that whatever drawbacks and burdens may be consequent upon the effort first to acquire and then to deploy nuclear weapons, they pale before the overwhelming and terrifying pro-

[7] General Assembly Resolution 2028 (XX), November 19, 1965.

[8] At a Pugwash Conference at Ronneby, Sweden, in September, 1967.

[9] *Effects of the Possible Use of Nuclear Weapons and the* Security *and Econoinic Implications for States of the Acquisition and further Development of these* ***Weapons*** (New York: United Nations. 1968), para. 54, p. 23.

spect of having to face a nuclear Power armed with conventional weapons alone. For while it certainly cannot be asserted positively that the possession of a second or third-rate nuclear capability will ensure the survival of a secondary Power in the event of such a confrontation — in other words, that a second or third-rate nuclear capability will suffice to deter a Power possessed of a first-rate capability — it is nevertheless abundantly clear that failure to acquire such weapons puts the conventionally-armed state squarely at the other's mercy. Nor does alliance with an existing nuclear Power offer a way out of this dilemma. The long-term viability of the NPT is contingent on the extent to which these difficulties are met.

The evolution of super-Power strategy and politics in recent years has confirmed again and again, however, that the entirely reasonable and readily-understandable first principle of Russian and American diplomatic behaviour is the avoidance of serious conflict with each other. Accordingly, if protection (i.e., a guarantee) by a military nuclear Power is to be of such quality that both the protected Power *and* the potential opponent will give it full credence, at least two pre-conditions will have to be satisfied.

First, it must be clear to all concerned that the protecting nuclear Power regards the integrity and independence of the protected state as of such importance that it is itself prepared to risk war with its nuclear opponent in the former's defence. But this, in turn, will only be recognised by all concerned if it is equally clear to all that the security and integrity of the protected Power can be assimilated, as it were, into the protecting Power's own security and integrity. This may be the case for Canada and the United States — which incidentally helps to explain why Canada does *not* consider that it requires nuclear weapons. But it is difficult to think of any other instance.

Second, and as a consequence of the first pre-condition, the diplomatic and military conduct of the protected Power must be (and be shown to be) controlled in all relevant and significant respects by the protecting Power — for otherwise the protecting Power could not possibly afford to undertake the risks involved; and if it appeared to be doing so, the hostile nuclear Power would rightly refuse to treat the undertaking seriously. Few states are content to accept satellite status voluntarily.

How closely class B states will, in the event, be guided by these considerations in determining their attitude to the NPT will depend, no doubt, on their view of the likely evolution of major international politics as they impinge on their affairs — on whether, for example, they are confident that Russia will continue to be governed by rulers who are uncertain about the precise limits of their freedom of manoeuvre in eastern Europe; on the extent to which the United States is thought liable to retreat into a neo-isolationist mood once her retirement from South-East Asia has been achieved; on whether China is thought likely to adopt harsher and more direct means of asserting her influence in eastern and southern Asia in the wake of the American withdrawal; on whether (or when) Japan will decisively abandon the 'low posture', and on how the German problem will ultimately evolve. These and other uncertainties are, of course, compounded with the fact that the three most feared and powerful states of all are, and will clearly remain, armed with nuclear weapons regardless of the fate of the NPT. And one of the three does not even propose to sign the treaty.

In bald terms, then, the fundamental urge and justification for acquiring nuclear weapons spring, in every significant case of a potential nuclear Power, from the politico-strategic implications for the potential nuclear Power in question of there being a nuclear arsenal controlled by a government whose future conduct and purposes are both uncertain and relevant to the potential nuclear Power's national security. The European neutrals' (Sweden's and Switzer-

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land's) debate on the acquisition of nuclear weapons hinges on Russia's nuclear capability; India's debate is a function of China's possession of these weapons, as is Japan's, and so forth.

Here, indeed, lies the central problem of nuclear proliferation, one which the framers of the NPT have not really tried to solve, nor could really be expected to solve — so great a revolution in the contemporary international system would be entailed. It is the super-Powers' own possession of nuclear weapons which provides whatever real incentive to acquire them that the serious candidates for entry into the nuclear club do have. The viability of the NPT — which is to say, the extent to which the existing membership of the two classes of states promises to remain unchanged — will therefore depend first and foremost on the actions of the established nuclear Powers themselves. So long as they continue to arm themselves with ever more potent nuclear weapons those countries which have both reason to fear them *and* the capacity to produce such weapons themselves will continue to wish to retain the option of doing so. In alternative terms, those who possess the option today will only be persuaded to renounce it finally if their fear of one or other of the super-Powers is met — either by a guarantee by the others or by the super-Power most relevant to their security divesting itself of its own nuclear arms. But individually the super-Powers can do neither one nor the other. They cannot give credible guarantees without endangering their own security by linking it to that of a minor state. They cannot disarm without radically altering the nature and content of their relations both with each other and with all actual and potential third parties.

It is presumably in an effort to cope with this problem that Britain, Russia and the United States have offered to make a solemn declaration in the Security Council of their readiness to go to the aid of any state subject to nuclear aggression or nuclear threat.[10] It is a very curious plan. At any rate, as a 'guarantee' it is impossible to take seriously. Against whom is it directed? In the interests of whom would the United States and Russia, in particular, risk nuclear war against each other, or against China, or even against Britain and France? If it is only intended against the 'nth' Power, it clearly fails to resolve the dangers which are uppermost in the minds of almost all — if not all — of those states which are anxious to retain the nuclear option: those, dangers emanating from some or all of the *existing* nuclear Powers.[11]

This leaves the other possible condition of a viable NPT: the cessation of the nuclear arms race between all class A states leading to the ultimate, but assured, dismantling of their full nuclear establishments. Up to now, the demand for moves in this direction has been met in two ways. On paper, by the inclusion of the following clause in the draft NPT:

> Each of the Parties to this Treaty undertakes to pursue negotiations in good faith on effective measures regarding cessation of the nuclear arms race and disarmament, and on a Treaty on General and Complete Disarmament under strict and effective international control. [Article VI.]

In deeds, the response of the class A states has been entirely different and may, not unfairly, be taken as the true measure of the sincerity and seriousness of the intention expressed in the article of the draft Treaty just quoted. The Geneva discussions have coincided with the super-

[10] The operativo paragraph of the draft resolution states that the Security Council 'Welcomes the intention expressed by certain states that they will provide or support irnmediate assistance, in accordance with the Charter, to any non-nuclear weapon state party to the Treaty on the non-proliferation of nuclear weapons that is a victim of an act or object of a threat of aggression in which nuclear weapons are used'.

[11] Asked whether the pledge represented a new, unilateral Arnerican commitment, Mr. R.J. McCloskey, the State Department spokesman, stoutly replied, " No. lt is not.... lt is a reaffirmation of the Security Council's capacity for dealing with a very serious problem."

Powers' resolve to go ahead with their respective Anti-Ballistic Missile systems, and with the general advance of the other nuclear Powers along the spiral path so well marked out and trodden by the Americans and Russians before them: greater arsenals, more sophisticated delivery systems, more effective ways of penetrating the opponent's defences and wreaking destruction upon him' And, not uncharacteristically, the opening of the General Assembly's debate on the NPT was marked by the detonation of the greatest-ever underground nuclear explosion in the Nevada desert.

* * *

It should be clear from the discussion up to this point that the importance of universal nuclear disarmament is not being stressed merely as an object to which we must all piously address ourselves on general moral grounds, for all that there are very good moral grounds for doing so. Nor is it seen here as a goal which, although eminently desirable, is not in fact attainable, and is therefore only deserving of our formal recognition before we go on to more serious affairs. True, this might appear to be the substance of the Russo-American attitude to the question; at any rate it is difficult to put any other serious construction on either their words or actions to date. And it is surely this that Mr. Mulley (and many others) have in mind when they speak of not allowing the best (nuclear disarmament) to be the enemy of the good (the NPT). In fact, the contention of this article is that nuclear disarmament — or *at the very least* a clear cessation of the present lunatic arms race between the super-Powers, ABM systems and all — is the pre-condition of the NPT's success — success being defined as the effective inhibition of the further proliferation of nuclear weapons. And it is because there is plainly not going to be any nuclear disarmament in the foreseeable future that the success of the NPT is impossible to envisage.

But this is not the only weakness of the NPT that prompts criticism. There is the consideration that by diverting attention away from the recognised implications of the *existing,* ever-increasing nuclear arsenals and concentrating discussion on the possible implications of entirely *hypothetical* forces, upon the establishment of which no government has yet embarked, still less decided, the great campaign for the NPT contains within itself positive dangers of its own. These dangers may be grouped under two heads. The first head may be loosely termed *diplomatic;* the second is probably best defined as *necrotic.*

The central diplomatic danger which the NPT in its present form embodies is easily identified. It is, simply, that an NPT could provide the most promising opportunity yet for the class B states to extract a measure of disarmament from the members of class A, or at any rate from the three military nuclear Powers which participated in the Geneva talks and which will duly sign and ratify the treaty. The latter want the treaty, and all the signs are that they want it badly; and they have clearly conceded the link between non-proliferation and disarmament. But they have not made, and on present showing will not make, any move to bind themselves treaty-wise to more than an undertaking 'to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date', and to nuclear and general disarmament. This is not an undertaking that has carried much conviction, and lack of confidence in the good faith of the super-Powers has, if anything, been strengthened by their summary rejection, in the last stages of the negotiations, of the Rumanian proposal to substitute a clearer and marginally tougher wording for Article VI. The Rumanian formulation deserves to be quoted in full:

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1. Nuclear-weapon States party to the Treaty undertake to adopt specific measures to bring about as soon as possible the cessation of the manufacture of nuclear weapons and the reduction and destruction of nuclear weapons and the means of their delivery.
2. If, five years after the entry into force of this Treaty, such measures shall not have been taken, the Parties shall examine the situation thus created and decide on the measures to be taken.[12]

It is surely in the light of the quite consistent Russo-American refusal to allow the issue of the NPT to impinge in any significant way on their own respective military postures that the Indian Prime Minister's bitter comment must he read:

> We believe in the validity of a step by step approach and do realise that it is not possible for a perfect Treaty to emerge immediately. However, it is reasonable to expect the Eighteen Nation Disarmament Commission *[sic],* which was designed to devise measures for disarmament, to come forward with some concrete step, even though small, in this direction. The present draft Treaty does not promote disarmament. And as long as the elaboration of nuclear weapons by nuclear-weapon Powers continues unchecked, it does not advance the security of the world. Measures which do not involve an element of self-restraint on the part of all States — nuclear-weapons States as well as non-nuclear-weapons States — cannot form the basis for a meaningful international agreement to promote disarmament.[13]

In short, if the non-military nuclear Powers now duly succumb to the already intense Russo-American pressure on them to rally round and sign — a pressure symbolised and, indeed, expressed in the joint appearance of Messrs. Kuznetsov and Goldberg before the Political Committee of the Assembly on April 26 — a unique opportunity for progress towards real disarmament will have been lost.

The second objection raised by the diplomatic implications and background to the NPT is marginally more complex, but only superficially less substantial. As the Indians and the Rumanians, most notably, have pointed out, the NPT enshrines a clear discriminatory principle. The well-established principle of the legal equality of states, already severely dented by certain provisions of the UN Charter, is dealt yet another blow, some states being specifically accorded the right to be a great deal more equal than others in respect both of the question who may and who may not maintain a military nuclear establishment and that of how the verification system is to operate.[14] There can he no doubt that few secondary and tertiary Powers regard this further erosion of the principle of the equality of states with equanimity. But it would seem to be less a sentimental attachment to legal forms that moves them than an uneasy feeling that something important is being surrendered in exchange for no clearly defined or substantial *quid pro quo.* It is, indeed, recognised that behind the formal issue of legal equality lies, once again, the very real politico-strategic problem of how the NPT relates — or fails to relate — to nuclear and, ultimately, general disarmament:

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[12] ENDC Document 223/Rev. 1, March 8, 1968.

[13] Statement in Parliament, March 14, 1968.

[14] However, the British Government, 'to assist [the Geneva] negotiations . . . have decided that, at such times as internacional safeguards are put into effect in the non-nuclear weapon states in implementation of the provisions of the treaty, they will he prepared to offer an opportunity for the application of similar safeguards in the United Kingdom subject to exclusions for national security reasons only'. Statement by Mr. Mulley in Parliament, December 4, 1967.

Le Traité instituera une discrimination juridique durable entre Etats selon qu'ils sont possesseurs ou non d'arines nucléaires. Y consentir représenterait pour les Etats non possesseurs un lourd sacrifice qui ne se conçoit sans contre-prestation. Comme c'est avant tout leur sécurité qui est mise en péril par la poursuite de la course aux armements, des progrès devraient être réalisés dans le domaine de sa limitation.

Thus the Swiss Government on the link between the formal and the substantive implications of the draft treaty.[15]

This brings us to those dangers, implicit in the NPT in its present form, which, for want of a better word, I would term necrotic. They are well known, hardly disputed, and have often been rehearsed. Yet in practice they are almost invariably ignored; and it is because the NPT project seems likely to divert attention from them once again, and in the most unfortunate of all ways — i.e., by purporting to offer a means of coping with them, that they are worth reviewing, however briefly, here. For this purpose one can hardly do better than pick out a few key passages from the impeccably authoritative report of the UN Secretary-General's consultative group on the *Effects of the Possible Use of Nuclear Weapons,* already alluded to.

> There is one inescapable and basic fact. It is that the nuclear armouries which are in being already contain large megaton weapons every one of which has a destructive power greater than that of all the conventional explosive that has ever been used in warfare since the day gunpowder was discovered. Were such weapons ever to be used in numbers, hundreds of millions of people might be killed, and civilisation as we know it . . . would inevitable come to an end in the countries involved in the conflict. Many of those who survived the immediate destruction, *as well as others in countries outside the area of conflict* ... would suffer from long-term effects of irradiation and transmit, to their offspring, a genetic burden which would become manifest in the disabilities of later generations.[16]
>
> The effects of all-out nuclear war, regardless of where it started, could not be confined to the Powers engaged in that war . . . Neighbouring countries, and even countries in parts of the world remote from the actual conflict, could soon become exposed to the hazards of radio-active fall-out . . . At least within the same hemisphere, an enduring radio-active hazard could exist for distant as well as close human populations, through the ingestion of foods derived from contaminated vegetables. . . Given a sufficient number [of bombs] no part of the world would escape exposure to biologically significant levels of radiation...
>
> The fact that a state of mutual nuclear deterrence prevails between the Super Powers does not, as we know all too well, prevent the outbreak of wars with conventional weapons involving both nuclear and non-nuclear nations; the risk of nuclear war remains as long as there are nuclear weapons.[17]
>
> . . . The reciprocal technological development and sophistication of nuclear warheads and their associated weapons systems which [result from the effort to maintain a state of nuclear deterrence constitute a spiralling nuclear arms race. Short of mutual agreement, it is a race which has no end [and which] cannot be expected to slow down until concrete

[15] *Aide-mémoire* transmitted to the American and Russian co-Chairmen of the ENDC, November 17, 1967.
[16] *Op. cit., p.* 1. Italics added.
[17] *Ibid*., pp. 19-20.

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> steps are taken which lead to disarmament and which promote the security of all nations.[18]

And finally,

> The basic facts about the nuclear bomb and its use are harsh and terrifying for civilisation; they have become lost in a mass of theoretical verbiage. It has been claimed that the world has learnt to live with the bomb; it is also said there is no need for it to drift unnecessarily into the position that it is prepared to die for it. The ultimate question for the world to decide in our nuclear age — and this applies both to nuclear and non-nuclear Powers — is what short-term interests it is prepared to sacrifice in exchange for an assurance of survival and security.[19]

The answer of the nuclear Powers — and first and foremost of the two most powerful among them — to this last question is, as the matter of the NPT shows, loud and clear: no short-term interests of any significance are to be sacrificed at all.

It is, of course, perfectly apparent that there can be no simple, rapid dismantling of the existing nuclear establishments without corresponding changes in the structure of international politics in general, and of super-Power politics in particular. For example, it can hardly be expected that Russia and the United States will agree to restrict themselves to conventional weapons so long as China's nuclear establishment remains intact, even if they themselves succeeded in a preliminary re-fashioning of the guide-lines of their policies towards each other. That the Chinese would probably not themselves have developed nuclear weapons had the United States and Russia not already done so does not, of course, in itself affect the validity of this proposition (if valid it is).

Again, a decision by one of the existing nuclear Powers to divest itself of its weapons would not seriously affect its continued command of the techniques of their construction: which is one reason among many why an agreement to dispose of existing weapons would itself be valueless unless accompanied by a credible system of verification. Yet, on present showing, international inspection within Russia and China, no matter how respectable the underlying purpose, is and will long remain unthinkable to the governing élites of either state. It is thus impossible to envisage a lasting solution of the problem on the basis of changes in the conduct of their *external* affairs alone. Then there are certain territorial problems, chief among them that of Germany, which have been frozen in their present uncomfortable, and yet not wholly unsatisfactory, forms as a direct consequence of the nuclear deadlock. What of them? In short, nothing is easier than the drawing up of a long list of entirely formidable reasons for disbelieving in the practicability of reversing what cannot but appear to be the current irreversible and headlong drive towards ever greater and ever more horrifying accumulations of destructive power.

* * *

In discussions of this kind it is customary, at this point, to suspend further judgment and substitute for the language of analysis the language of hope. It may be disguised by argument along the lines 'progress must be gradual'. It is often said in favour of the NPT that since it follows the agreement on the non-nuclearisation of Antarctica and the Partial Test-ban Treaty, it, in turn, might be followed by still better things in years to come. But such a hope cannot be

[18] *Ibid.,* p. 32.
[19] *Ibid.,* p. 20.

more than pious. And if one were to insist on making such a false extrapolation from the admittedly undeniable, but nevertheless very small, achievements in the field of disarmament to date, others would surely be equally justified in making a comparable extrapolation into the future from the current rate of armament. Nor could it be denied that progress in the former field is pitiful when compared with growth in the latter.

Thus it seems to me that conclusions of a very different and much gloomier order are unavoidable. Briefly they are these:

First, that the contemporary international system of sovereign, competing and ridiculously unequal states is becoming, if it has not already become, fundamentally incompatible with human survival. The Grotian concept of the regulation and limitation of war is defunct in the age of ABC weapons because the prime incentive both to acquire and employ ABC weapons is itself provided by the incidence of war — in any form and with any weapons — and of warlike postures. States as we know them are clearly unwilling and unable to surrender the right to go to war and the right to demonstrate their capacity to do so — at any rate until there ceases to be cause to suspect hostility in others. In other words, the ending of all major forms of international competition — military, political, economic, ethnic, and cultures among them — is the *sine qua non* of a secure and perpetual peace. Unfortunately, the message of the Geneva discussions has been that while both the super-Powers and the non-nuclear Powers dimly perceive the validity of this commonplace in relation to the *non-nuclear* Powers, the superpowers are unwilling or incapable of seeing its infinitely graver implications for themselves.

It therefore follows, *second,* that the view we take of the system proposed at Geneva and implied in the NPT must depend *inter alia* on what confidence we are prepared to place in the capacity and will of the preponderant Powers themselves to abstain from actions likely to increase the incidence of international conflict — any conflict, anywhere — on the one hand, and to assert such control and influence as they have over other states which are disposed to adopt hostile courses of behaviour on the other hand. The merest glance at two great arenas of contemporary armed conflict, the Middle East and South-East Asia, and recollection of recent Soviet activity in the former and American activity in the latter, are hardly encouraging in this respect.

Third, the Geneva debates and the form the NPT has taken constitute a demonstration of the incapacity of the minor Powers to induce the greater Powers to deal with a matter which is of overwhelming concern to us all, and to fail, moreover, in a forum where the fiction of the equality of states is more carefully honoured than in any other and their position correspondingly strong. It is surely not too much to class this failure of nerve on the part of those non-nuclear weapons states which participated in the ENDC discussions with other symptoms of the emerging bankruptcy of the United Nations system.

Fourth, the assumption by the nuclear Powers of a unique right and capacity to bolster their respective military establishments with nuclear weapons, coupled with the arrogant demand that the non-nuclear states abstain from following their example, bodes ill for the future. The logic of the Russo-American position at Geneva is akin to the logic of the British and French pressure on Czechoslovakia in September 1938, if not of the Munich Conference itself: the weak must not complicate affairs for the strong because the latter alone are equipped to deal with the central international issues. To the question, when and how they, the strong, will begin to do so the answer today, as always, is not quite yet. Talking of pie in the sky is, perhaps, the oldest of political ploys. But in the present context it is not merely inadequate, it is monstrous.

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All told, then, the matter of the NPT suggests that the auguries for the future are poor. They are poor in respect of the NPT itself as a specific means of inhibiting further proliferation of nuclear weapons — both vertical and horizontal. And they are poor in that the NPT offers no cause to believe that the long-awaited step towards a solution of the more fundamental and very much graver need to liquidate existing nuclear arsenals is at all in prospect.

Against Nuclear Apartheid[1]

Jaswant Singh

THE CASE FOR INDIA'S TESTS

WHILE THE end of the Cold War transformed the political landscape of Europe, it did little to ameliorate India's security concerns. The rise of China and continued strains with Pakistan made the 1980s and 1990s a greatly troubling period for India. At the global level, the nuclear weapons states showed no signs of moving decisively toward a world free of atomic danger. Instead, the nuclear nonproliferation treaty (NPT) was extended indefinitely and unconditionally in 1995, perpetuating the existence of nuclear weapons in the hands of five countries busily modernizing their nuclear arsenals. In 1996, after they had conducted over 2000 tests, a Comprehensive Test Ban Treaty (CTBT) was opened for signature, following two and a half years of negotiations in which India participated actively. This treaty, alas, was neither comprehensive nor related to disarmament but rather devoted to ratifying the nuclear status quo. India's options had narrowed critically.

India had to ensure that its nuclear option, developed and safe-guarded over decades, was not eroded by self-imposed restraint. Such a loss would place the country at risk. Faced with a difficult decision, New Delhi realized that its lone touchstone remained national security. The nuclear tests it conducted on May 11 and 13 were by then not only inevitable but a continuation of policies from almost the earliest years of independence. India's nuclear policy remains firmly committed to a basic tenet: that the country's national security in a world of nuclear proliferation lies either in global disarmament or in exercise of the principle of equal and legitimate security for all.

THE TESTS OF MAY

IN 1947, when a free India took its rightful place in the world, both the nuclear age and the Cold War had already dawned. Instead of aligning with either bloc, India rejected the Cold War paradigm and chose the more difficult path of nonalignment. From the very beginning, India's foreign policy was based on its desire to attain an alternative global balance of power that, crucially, was structured around universal, nondiscriminatory disarmament.

Nuclear technology had already transformed global security. Nuclear weapons, theorists reasoned, are not actually weapons of war but, in effect, military deterrents and tools of possible diplomatic coercion. The basis of Indian nuclear policy, therefore, remains that a world free of nuclear weapons would enhance not only India security but the security of all nations. In the absence of universal disarmament, India could scarcely accept a regime that arbitrarily divided nuclear haves from have-nots. India has always insisted that all nations' security interests are equal and legitimate. From the start, therefore, its principles instilled a distaste for the self-identified and closed club of the five permanent members of the U.N. Security Council.

During the 1950s, nuclear weapons were routinely tested above ground, making the mushroom cloud the age's symbol. Even then, when the world had witnessed only a few dozen tests, India took the lead in calling for an end to all nuclear weapons testing, but the calls of India's first prime minister, Jawaharlal Nehru, went unheeded.

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[1] Appeared in *Foreign Affairs*, September/October 1998. Jaswant Singh is Senior Adviser on Defense and Foreign Affairs to Indian Prime Minister Atal Bihari Vajpayee and a Member of Parliament for the Bharatiya Janata Party.

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In the 1960s, India's security concerns deepened. In 1962, China attacked India on its Himalayan border. The nuclear age entered India's neighborhood when China became a nuclear power in October 1964. From then on, no responsible Indian leader could rule out the option of following suit.

With no international guarantees of Indian security forthcoming, nuclear abstinence by India alone seemed increasingly worrisome. With the 1962 war with China very much on his mind, Indian Prime Minister Lal Bahadur Shastri began tentatively investigating a subterranean nuclear explosion project. A series of Indian nonproliferation initiatives had scant impact. In 1965, to make matters worse, the second war between India and Pakistan broke out. Shastri died in 1966 and was succeeded by Indira Gandhi, who continued the fruitless search for international guarantees. In 1968, India reaffirmed its commitment to disarmament but decided not to sign the NPT. In 1974, it conducted its first nuclear test, Pokharan I.

The first 50 years of Indian independence reveal that the country's moralistic nuclear policy and restraint paid no measurable dividends, except resentment that India was being discriminated against. Disarmament seemed increasingly unrealistic politics. If the permanent five's possession of nuclear weapons increases security, why would India's possession of nuclear weapons be dangerous? If the permanent five continue to employ nuclear weapons as an international currency of force and power, why should India voluntarily devalue its own state power and national security? Why admonish India after the fact for not failing in line behind a new international agenda of discriminatory nonproliferation pursued largely due to the internal agendas or political debates of the nuclear club? If deterrence works in the West-as it so obviously appears to, since Western nations insist on continuing to possess nuclear weapons-by what reasoning will it not work in India? Nuclear weapons powers continue to have, but preach to the have-nots to have even less. India counters by suggesting either universal, nondiscriminatory disarmament or equal security for the entire world.

India is alone in the world in having debated the available nuclear options for almost the last 35 years. No other country has deliberated so carefully and, at times, torturously over the dichotomy between its sovereign security needs and global disarmament instincts, between a moralistic approach and a realistic one, and between a covert nuclear policy and an overt one. May 11, 1998, changed all that. India successfully carried out three underground nuclear tests, followed on May 13 by two more underground, sub-kiloton tests. These five tests, ranging from the sub-kiloton and fission variety to a thermonuclear device, amply demonstrated India's scientific, technical, and organizational abilities, which until then had only been vaguely suspected. A fortnight later, on May 28 and 30, neighboring Pakistan predictably carried out its own tests in the bleak fastness of the Chagai Hills in Baluchistan, near the Afghan border. Suddenly the strategic equipoise of the post-Cold War world was rattled. The entire nonproliferation regime and the future of disarmament were at the forefront of international agendas.

THE FAILURE OF THE OLD REGIME

SINCE INDEPENDENCE, India has consistently advocated global nuclear disarmament, convinced that a world without nuclear weapons will enhance both global and Indian security. India was the first to call for a ban on nuclear testing in 1954, for a nondiscriminatory treaty on nonproliferation in 1965, for a treaty on nonuse of nuclear weapons in 1978, for a nuclear freeze in 1982, and for a phased program for complete elimination of nuclear weapons in 1988. Unfortunately, most of these initiatives were rejected by the nuclear weapons states, who still consider these weapons essential for their own security. What emerged, in consequence, has been a discriminatory and flawed nonproliferation regime that damages India's se-

curity. For years India conveyed its apprehensions to other countries, but this did not improve its security environment. This disharmony and disjunction between global thought and trends in Indian thought about nuclear weapons is, unfortunately, the objective reality of the world. Nuclear weapons remain a key indicator of state power. Since this currency is operational in large parts of the globe, India was left with no choice but to update and validate the capability that had been demonstrated 24 years ago in the nuclear test of 1974.

India's May 1998 tests violated no international treaty obligations. The CTBT, to which India does not subscribe, permits parties to withdraw if they believe their supreme national interests to be jeopardized. Moreover, the forcing of an unconditional and indefinite extension of the NPT on the international community made 1995 a watershed in the evolution of the South Asian situation. India was left with no option but to go in for overt nuclear weaponization. The Sino-Pakistani nuclear weapons collaboration — a flagrant violation of the NPT — -made it obvious that the NPT regime had collapsed in India's neighborhood. Since it is now argued that the NPT is unamendable, the legitimization of nuclear weapons implicit in the unconditional and indefinite extension of the NPT is also irreversible. India could have lived with a nuclear option but without overt weaponization in a world where nuclear weapons had not been formally legitimized. That course was no longer viable in the post-1995 world of legitimized nuclear weapons. Unfortunately, the full implications of the 1995 NPT extension were debated neither in India nor abroad. This fatal setback to nuclear disarmament and to progress toward delegitimization of nuclear weapons was thoughtlessly hailed by most peace movements abroad as a great victory.

Nor was the CTBT helpful. In negotiations on the CTBT in 1996, India for the first time stated that the nuclear issue is a national security concern for India and advanced that as one reason why India was unable to accede to the CTBT. Presumably this persuaded the nuclear hegemons to introduce a clause at the last minute pressing India, along with 43 other nations, to sign the treaty to bring it into force. This coercive clause violates the Vienna Convention on Treaties, which stipulates that a nation not willing to be a party to a treaty cannot have obligations arising out of that treaty imposed on it. Even more galling, this clause was introduced at the insistence of China — the provider of nuclear technology to Pakistan. When the international community approved the coercive CTBT, India's security environment deteriorated significantly.

India's plight worsened as the decade wore on. In 1997 more evidence surfaced on the proliferation between China and Pakistan and about U.S. permissiveness on this issue. During Chinese President Jiang Zemin's recent visit to Washington, the United States insisted on a separate agreement with China on Chinese proliferation to Iran and Pakistan, which the Chinese signed instead of professing their innocence. Both the U.S. unease and the Chinese signature attest to Chinese proliferation as a threat to India's security. After all these assurances, China continued to pass missile technology and components to Pakistan. Despite this, the Clinton administration was still willing to certify that China was not proliferating or — even worse for India — that the United States was either unable or unwilling to restrain China. As the range of options for India narrowed, so, too, did the difficulties of taking corrective action.

A FINE BALANCE

TODAY INDIA is a nuclear weapons state. This adds to its sense of responsibility as a nation committed to the principles of the U.N. Charter and to promoting regional peace and stability.

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During the past 50 years, India made its nuclear decisions guided only by its national interest, always supported by a national consensus. The May 1998 tests resulted from earlier decisions and were possible only because those decisions had been taken correctly.

The earliest Indian forays into the question of nuclear disarmament were admittedly more moralistic than realistic. The current disharmony, therefore, between India and the rest of the globe is that India has moved from being totally moralistic to being a little more realistic, while the rest of the nuclear world has arrived at all its nuclear conclusions entirely realistically. With a surplus of nuclear weapons and the technology for fourth-generation weapons, the other nuclear powers are now beginning to move toward a moralistic position. Here is the cradle of lack of understanding about the Indian stand.

The first and perhaps principal obstacle in understanding India's position lies in the failure to recognize the country's security needs; of the need in this nuclearized world for a balance between the rights and obligations of all nations; of restraint in acquisition of nuclear weaponry; of ending today's unequal division between nuclear haves and have-nots. No other country in the world has demonstrated the restraint that India has for the nearly quarter-century after the first Pokharan test in 1974.

Now, as the century turns, India faces critical choices. India had witnessed decades of international unconcern and incomprehension as its security environment, both globally and in Asia, deteriorated. The end of the Cold War created the appearance of American unipolarity but - also led to the rise of additional power centers. The fulcrum of the international balance of power shifted from Europe to Asia. Asian nations began their process of economic resurgence. The Asia-Pacific as a trade and security bloc became a geopolitical reality. But the rise of China led to new security strains that were not addressed by the existing nonproliferation regime. The 1995 indefinite extension of the NPT — essentially a Cold War arms control treaty with a heretofore fixed duration of 25 years — legitimized in perpetuity the existing nuclear arsenals and, in effect, an unequal nuclear regime. Even as the nations of the world acceded to the treaty, the five acknowledged nuclear weapons powers — Britain, China, France, Russia, and the United States — stood apart; the three undeclared nuclear weapons states — India, Israel, and Pakistan — were also unable to subscribe. Neither the world nor the nuclear powers succeeded in halting the transfer of nuclear weapons technology from declared nuclear weapons powers to their preferred clients. The NPT notwithstanding, proliferation in India's back yard spread.

Since nuclear powers that assist or condone proliferation are subject to no penalty, the entire nonproliferation regime became flawed. Nuclear technologies became, at worst, commodities of international commerce and, at best, lubricants of diplomatic fidelity. Chinese and Pakistani proliferation was no secret. Not only did the Central Intelligence Agency refer to it but, indeed, from the early 1990s the required U.S. presidential certification of nonproliferation could not even be provided. India is the only country in the world sandwiched between two nuclear weapons powers.

Today most nations are also the beneficiaries of a nuclear security paradigm. From Vancouver to Vladivostok stretches a club: a security framework in which four nuclear weapons powers, as partners in peace, provide extended deterrent protection. The Americas are under the U.S. nuclear deterrent as members of the Organization of American States. South Korea, Japan, and Australasia are also under the U.S. umbrella. China is, of course, a major nuclear power. Only Africa and southern Asia remain outside this new international nuclear paradigm where nuclear weapons and their role in international conduct are paradoxically legitimized. These differ-

entiated standards of national security — a sort of international nuclear apartheid — are not simply a challenge to India but demonstrate the inequality of the entire nonproliferation regime.

In the aftermath of the Cold War, an Asian balance of power is emerging with new alignments and new vacuums. India, in exercise of its supreme national interests, has acted in a timely fashion to correct an imbalance and fill a potentially dangerous vacuum. It endeavors to contribute to a stable balance of power in Asia, which it holds will further the advance of democracy. A more powerful India will help balance and connect the oil-rich Gulf region and the rapidly industrializing countries of Southeast Asia.

To India's north is the Commonwealth of Independent States, a reservoir that has yet to be fully developed. The Soviet Union's successor, Russia, has considerably less international prestige. Inevitably, the previously existing alliance between India and the former U.S.S.R. has eroded.

On India's western flank lies the Gulf region, a critical source of the world's energy. India has ancient links to the area, as it does to the former Soviet lands. It also has extensive energy import requirements. The Gulf employs Indian labor and talent. However, this region and its neighbors have been targets of missile and nuclear proliferation. Long-range missiles entered this area in the mid-1980s. Since 1987, nuclear proliferation in the Gulf, with extraregional assistance, has continued unchecked.

Faced as India was with a legitimization of nuclear weapons by the haves, a global nuclear security paradigm from which it was excluded, trends toward disequilibrium in the Asian balance of power, and a neighborhood in which two nuclear weapons countries act in concert, India had to protect its future by exercising its nuclear option. By so doing, India has brought into the open the nuclear reality that had remained clandestine for at least the past ii years. India could not accept a flawed nonproliferation regime as the international norm when all realities conclusively demanded the contrary.

India's policies toward its neighbors and others have not changed. The country remains fifty committed to the promotion of peace, stability, and resolution of all outstanding issues through bilateral dialogue and negotiations. The tests of May 11 and 13 were not directed against any country. They were intended to reassure the people of India about their own security. Confidence-building is a continuous process to which India remains committed.

India's motive remains security, not, as some have speciously charged, domestic politics. Had the tests been motivated simply by electoral exigencies, there would have been no need to test the range of technologies and yields demonstrated in May. In the marketplace of Indian public fife, a simple low-yield device would have sufficed. Since that marketplace did not govern the decision to experiment, the tests encompassed the range of technologies necessary to make a credible nuclear deterrent.

JOIN THE CLUB

INDIA is now a nuclear weapons state, as is Pakistan. That reality can neither be denied nor wished away. This category of "nuclear weapons state" is not, in actuality, a conferment. Nor is it a status for others to grant. It is, rather, an objective reality. India's strengthened nuclear capability adds to its sense of responsibility — the obligation of power. India, mindful of its international duties, is committed to not using these weapons to commit aggression or to mount threats against any country. These are weapons of self-defense, to ensure that India, too, is not subjected to nuclear coercion.

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India has reiterated its desire to enter into a no-first-use agreement with any country, either negotiated bilaterally or in a collective forum. India shall not engage in an arms race, nor, of course, shall it subscribe to or reinvent the sterile doctrines of the Cold War. India remains committed to the basic tenet of its foreign policy-a conviction that global elimination of nuclear weapons will enhance its security as well as that of the rest of the world. It will continue to urge countries, particularly other nuclear weapons states, to adopt measures that would contribute meaningfully to such an objective. This is the defining difference. It is also the cornerstone of India's nuclear doctrine.

That is why India will continue to support initiatives, taken individually or collectively, by the Non-Aligned Movement, which has continued to attach the highest priority to nuclear disarmament. This was reaffirmed most recently at the NAM ministerial meeting held soon after India had conducted its recent series of underground tests. The NAM ministers reiterated their call at the Conference on Disarmament to establish, as the highest priority, an ad hoc committee to start negotiations in 1998 on a phased program for the complete elimination of nuclear weapons within a specified time, including a nuclear weapons convention. The collective voice of 113 NAM countries echoes an approach to global nuclear disarmament to which India has remained committed.

One NAM initiative, to which great importance is attached, resulted in the International Court of Justice's unanimous July 1996 declaration that there is an international obligation to pursue in good faith and bring to a conclusion negotiations leading to comprehensive nuclear disarmament under strict and effective international control. India was one of the countries that appealed to the ICJ on this issue. No other nuclear weapons state has supported this judgment; in fact, they all have decried it. India has been and will continue to be in the forefront of the calls for opening negotiations for a nuclear weapons convention. This challenge should be confronted with the same vigor that has dealt with the scourges of biological and chemical weapons. In keeping with its commitment to comprehensive, universal, and nondiscriminatory approaches to disarmament, India is an original party to the conventions against both. In recent years, in keeping with these new challenges, India has actively promoted regional cooperation-in the South Asian Association for Regional Cooperation, in the Indian Ocean Rim Association for Regional Cooperation, and as a member of the Association of Southeast Asian Nations Regional Forum. This engagement will continue. The policies of economic liberalization introduced in recent years have increased India's regional and global linkages, and India shall deepen and strengthen these ties.

India's nuclear policy has been marked by restraint and openness. It has not violated any International agreements, either in 1974 or 1998. This restraint is a unique example. Restraint, however, has to arise from strength. It cannot be based upon indecision or hesitancy. Restraint is valid only when it removes doubts, which is precisely what India's tests did. The action involved was balanced-the mini-mum necessary to maintain an irreducible component of the country's national security calculus.

Even before 1990, when Congress passed the Pressler amendment cutting off economic and military aid to Pakistan to protest its development of a nuclear program, the genie of nuclear proliferation on the Indian subcontinent was out of the bottle. The much-quoted 1987 interview in which Abdul Qadeer Khan, the chief Pakistani nuclear scientist, verified the existence of Islamabad's bomb simply confirmed what New Delhi had long suspected. The United States, then still engaged in Afghanistan, continued to deny that Pakistan had crossed the nu-

clear threshold. The explosions at the Chagai Hills on May 28 and 30 testify to the rightness of India's suspicions.

After the tests, India stated that it will henceforth observe a voluntary moratorium and refrain from conducting underground nuclear test explosions. It has also indicated a willingness to move toward a de jure formalization of this declaration. The basic obligation of the CTBT is thus met: to undertake no more nuclear tests. Since India already subscribes to the substance of the test ban treaty, all that remains is its actual signature.

India has also expressed readiness to participate in negotiations in the Conference on Disarmament in Geneva on a fissile material cut-off treaty. The basic objective of this pact is to prohibit future production of fissile materials for use in nuclear weapons. India's approach in these negotiations will be to ensure that this treaty is universal, nondiscriminatory, and backed by an effective verification mechanism. That same constructive approach will underlie India's dialogue with countries that need to be persuaded of India's serious intent. The challenge to Indian statecraft remains to reconcile India's security imperatives with valid international concerns regarding nuclear weapons.

Let the world move toward finding more realistic solutions and evolving a universal security paradigm for the entire globe. Since nuclear weapons are not really usable, the dilemma lies, paradoxically, in their continuing deterrent value. This paradox further deepens the concern of statesmen. How are they to employ state power in the service of national security and simultaneously address international concerns? How can they help the world create an order that ensures a peaceful present and an orderly future? How are they to reconcile the fact that nuclear weapons have a deterrent value with the objective global reality that some countries have this value and others do not? How can a lasting balance be founded? While humanity is indivisible, national security interests, as expressions of sovereignty, are not. What India did in May was to assert that it is impossible to have two standards for national security - one based on nuclear deterrence and the other outside of it.

The end of the Cold War did not result in the end of history. The great thaw that began in the late 198os only melted down the ancient animosities of Europe. We have not entered a unipolar order. India still lives in a rough neighborhood. It would be a great error to assume that simply advocating the new mantras of globalization and the market makes national security subservient to global trade. The 21st century will not be the century of trade. The world still has to address the unfinished agenda of the centuries.

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Evolution of the reaction by the international community to The nuclear tests by India and Pakistan: Three steps

1. Statement by New Zealand in the Conference on Disarmament: 2 June 1998.
2. Joint communiqué of the five permanent members of the Security Council: 4 June 1998.
3. Resolution 1172 (1998) of the UN Security Council: 5 June 1998.

1. Statement by New Zealand in the Conference on Disarmament: 2 June 1998.

Mr. President, first may I take the opportunity to congratulate you on assuming the Presidency, it is good to see you in the chair and you can rely on the full support of my delegation.

Mr. President I am taking the floor at this Special Session to read into the record a statement from the following Member States and Observers of the Conference: Australia, New Zealand, United States, United Kingdom of Great Britain, Netherlands, Austria, Finland, Ukraine, Canada, Greece, Slovakia, Hungary, Sweden, Belarus, Germany, Poland, Switzerland, Norway, Philippines, Denmark, Italy, Romania, Croatia, Czech Republic, Kazakhstan, Japan, Malta, Bulgaria, Mongolia, Russian Federation, Republic of Korea, France, China, Turkey, Spain, Mexico, Brazil, South Africa, Chile, Ireland, Venezuela, Ecuador, Argentina.

Mr. President, they are alarmed and deeply concerned at nuclear testing by India and Pakistan.

They condemn all nuclear testing and consider such acts to be contrary to the international consensus which bans the testing of nuclear weapons and other explosive devices.

The tests undertaken by India and Pakistan's decision to respond with its own tests, blatantly undermine the international regime of non-proliferation of nuclear weapons. The actions of India and Pakistan threaten and undermine the process of disarmament and the goal of eliminating nuclear weapons altogether.

The testing of nuclear weapons by India and Pakistan is totally irreconcilable with claims by both countries that they are committed to nuclear disarmament.

International security will not be enhanced by provocative and dangerous acts. Nor will regional or global security be improved or maintained by indulging in competitive manoeuvres to further develop nuclear capability and delivery systems. The approach that India and Pakistan seem determined to pursue belongs to a by-gone age.

Peace in the Asia region is a global concern. Tensions will only be resolved permanently through constructive dialogue and negotiation.

It is now crucial that India and Pakistan announce immediately a cessation to all further testing of these weapons, renounce their nuclear weapons programmes and sign and ratify, unconditionally, the Comprehensive Test Ban Treaty. This is a matter of urgency and essential for generating the confidence necessary for security differences to be resolved through dialogue and negotiation.

We also call on India and Pakistan to accede, without delay, to the Non-Proliferation Treaty, to join all States in ensuring the non-proliferation of nuclear weapons and to engage in negotiations to conclude a ban on the production of fissile material. These are further essential steps that should be taken in the process of working collectively and constructively towards the elimination of nuclear weapons.

This is a moment for all countries to exercise calm and maximum restraint. We call on India and Pakistan to abandon immediately the course of action they are pursuing and to settle their security concerns and differences through political engagement. Such an approach will have the full support of the international community which is striving towards nuclear disarmament.

2. Joint communiqué of the five permanent members of the Security Council: 4 June 1998.

1. Bearing in mind the responsibility of their countries for the maintenance of international peace and security, the Foreign Ministers of China, France, Russia, the United Kingdom and the United States met in Geneva on June 4, 1998 to coordinate their response to the grave situation created by the nuclear tests carried out in May 1998 by India and then by Pakistan. The Ministers condemned these tests, expressed their deep concern about the danger to peace and stability in the region, and pledged to cooperate closely in urgent efforts to prevent a nuclear and missile arms race in the Subcontinent, to bolster the non-proliferation regime, and to encourage reconciliation and peaceful resolution of differences between India and Pakistan.

2. The Ministers agreed that quick action is needed to arrest the further escalation of regional tensions stimulated by the recent nuclear tests. India and Pakistan should therefore stop all further such tests. They should refrain from the weaponization or deployment of nuclear weapons, from the testing or deployment of missiles capable of delivering nuclear weapons, and from any further production of fissile material for nuclear weapons. They should also halt provocative statements, refrain from any military movements that could be construed as threatening, and increase transparency in their actions. Direct communications between the parties could help to build confidence.

3. To reinforce security and stability in the region and more widely, the Five strongly, believe that India and Pakistan should adhere to the Comprehensive Nuclear Test Ban Treaty immediately and unconditionally, thereby facilitating its early entry into force. The Five also call upon India and Pakistan to participate, in a positive spirit and on the basis of the agreed mandate, in negotiations with other states in the Conference on Disarmament for a Fissile Material Cut-off Convention with a view to reaching early agreement. The Five will seek firm commitments by India and Pakistan not to weaponize or deploy nuclear weapons or missiles. India and Pakistan should also confirm their policies not to export equipment, materials or technology that could contribute to weapons of mass destruction or missiles capable of delivering them, and should undertake appropriate commitments in that regard.

4. The Ministers agreed that the international non-proliferation regime must remain strong and effective despite the recent nuclear tests in South Asia. Their goal continues to be adherence by all countries, including India and Pakistan, to the Nuclear Non-Proliferation Treaty (NPT) as it stands, without any modification. This Treaty is the cornerstone of the non-proliferation regime and the essential foundation for the pursuit of nuclear disarmament. Notwithstanding their recent nuclear tests, India and Pakistan do not have the status of nuclear weapons states in accordance with the NPT.

5. The Ministers concluded that efforts to resolve disputes between India and Pakistan must be pursued with determination. The Ministers affirm their readiness to assist India and Pakistan, in a manner acceptable to both sides, in promoting reconciliation and cooperation. The Ministers pledged that they will actively encourage India and Pakistan to find mutually ac-

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ceptable solutions, through direct dialogue, that address the root causes of the tension, including Kashmir, and to try to build confidence rather than seek confrontation. In that connection, the Ministers urged both parties to avoid threatening military movements, cross-border violations, or other provocative acts.

6. The Ministers also considered what actions the Five could take, individually or collectively, to foster peace and security in South Asia. They will encourage India and Pakistan to adopt practical measures to prevent an arms race. They confirmed their respective policies to prevent the export of equipment, materials or technology that could in any way assist programmes in India or Pakistan for nuclear weapons or for ballistic missiles capable of delivering such weapons. They also undertook to do all they could to facilitate a reduction of tensions between those states, and to provide assistance, at the request of both parties, in the development and implementation of confidence- and security-building measures. They remain determined to fulfill their commitments relating to nuclear disarmament under Article VI of the NPT.

7. The Ministers viewed their meeting in Geneva as setting in motion a process aimed at strengthening peace and stability in South Asia, at encouraging restraint by India and Pakistan, at promoting the resolution of outstanding differences, and at bolstering the international nonproliferation regime. They will remain fully engaged in pursuing these goals, and will work actively to build broad support in the international community for the objectives they agreed today.

3. Resolution 1172 (1998) of the UN Security Council: 5 June 1998.

The Security Council,

Reaffirming the statements of its President of 14 May 1998 (S/PRST/1998/12) and of 29 May 1998 (S/PRST/1998/17),

Reiterating the statement of its President of 31 January 1992 (S/23500), which stated, inter alia, that the proliferation of all weapons of mass destruction constitutes a threat to international peace and security,

Gravely concerned at the challenge that the nuclear tests conducted by India and then by Pakistan constitute to international efforts aimed at strengthening the global regime of nonproliferation of nuclear weapons, and also gravely concerned at the danger to peace and stability in the region,

Deeply concerned at the risk of a nuclear arms race in South Asia, and determined to prevent such a race,

Reaffirming the crucial importance of the Treaty on the Non-Proliferation of Nuclear Weapons and the Comprehensive Nuclear Test Ban Treaty for global efforts towards nuclear nonproliferation and nuclear disarmament,

Recalling the Principles and Objectives for Nuclear Non-Proliferation and Disarmament adopted by the 1995 Review and Extension Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, and the successful outcome of that Conference,

Affirming the need to continue to move with determination towards the full realization and effective implementation of all the provisions of the Treaty on the Non-Proliferation of Nuclear

Weapons, and welcoming the determination of the five nuclear-weapon States to fulfil their commitments relating to nuclear disarmament under Article VI of that Treaty,

Mindful of its primary responsibility under the Charter of the United Nations for the maintenance of international peace and security,

1. *Condemns* the nuclear tests conducted by India on 11 and 13 May 1998 and by Pakistan on 28 and 30 May 1998;

2. *Endorses* the Joint Communique issued by the Foreign Ministers of China, France, the Russian Federation, the United Kingdom of Great Britain and Northern Ireland and the United States of America at their meeting in Geneva on 4 June 1998 (S/1998/473);

3. *Demands* that India and Pakistan refrain from further nuclear tests and in this context calls upon all States not to carry out any nuclear weapon test explosion or any other nuclear explosion in accordance with the provisions of the Comprehensive Nuclear Test Ban Treaty;

4. *Urges* India and Pakistan to exercise maximum restraint and to avoid threatening military movements, cross-border violations, or other provocations

in order to prevent an aggravation of the situation;

5. *Urges* India and Pakistan to resume the dialogue between them on all outstanding issues, particularly on all matters pertaining to peace and security, in order to remove the tensions between them, and encourages them to find mutually acceptable solutions that address the root causes of those tensions, including Kashmir;

6. *Welcomes* the efforts of the Secretary-General to encourage India and Pakistan to enter into dialogue;

7. *Calls upon* India and Pakistan immediately to stop their nuclear weapon development programmes, to refrain from weaponization or from the deployment of nuclear weapons, to cease development of ballistic missiles capable of delivering nuclear weapons and any further production of fissile material for nuclear weapons, to confirm their policies not to export equipment, materials or technology that could contribute to weapons of mass destruction or missiles capable of delivering them and to undertake appropriate commitments in that regard;

8. *Encourages* all States to prevent the export of equipment, materials or technology that could in any way assist programmes in India or Pakistan for nuclear weapons or for ballistic missiles capable of delivering such weapons, and welcomes national policies adopted and declared in this respect;

9. *Expresses* its grave concern at the negative effect of the nuclear tests conducted by India and Pakistan on peace and stability in South Asia and beyond;

10. *Reaffirms* its full commitment to and the crucial importance of the Treaty on the Non-Proliferation of Nuclear Weapons and the Comprehensive Nuclear Test Ban Treaty as the cornerstones of the international regime on the non-proliferation of nuclear weapons and as essential foundations for the pursuit of nuclear disarmament;

11. Expresses its firm conviction that the international regime on the non-proliferation of nuclear weapons should be maintained and consolidated and recalls that in accordance with the Treaty on the Non-Proliferation of Nuclear Weapons India or Pakistan cannot have the status of a nuclear-weapon State;

12. *Recognizes* that the tests conducted by India and Pakistan constitute a serious threat to global efforts towards nuclear non-proliferation and disarmament;

13. *Urges* India and Pakistan, and all other States that have not yet done so, to become Parties to the Treaty on the Non-Proliferation of Nuclear Weapons and to the Comprehensive Nuclear Test Ban Treaty without delay and without conditions;

14. *Urges* India and Pakistan to participate, in a positive spirit and on the basis of the agreed mandate, in negotiations at the Conference on Disarmament in Geneva on a treaty banning the production of fissile material for nuclear weapons or other nuclear explosive devices, with a view to reaching early agreement;

15. *Requests* the Secretary-General to report urgently to the Council on the steps taken by India and Pakistan to implement the present resolution;

16. *Expresses* its readiness to consider further how best to ensure the implementation of the present resolution;

17. *Decides* to remain actively seized of the matter.

Agreement between the United States and India on nuclear questions
(Four notes)

1. Zia Mian and M. V. Ramana, "Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal With India" (page 221);
2. Arms Control Association, "India's Choice, Congress' Responsibility" (229);
3. Congress Approves India Nuclear Bill (230); y
4. Bush signs US-India nuclear bill (231).

1. Wrong Ends, Means, and Needs: Behind the U.S. Nuclear Deal With India[1]

Zia Mian and M. V. Ramana[2]

President George W. Bush and Indian Prime Minister Manmohan Singh issued a joint statement on July 18, 2005, laying the grounds for the resumption of full U.S. and international nuclear aid to India. Such international support was key to India developing its nuclear infrastructure and capabilities and was essentially stopped after India's 1974 nuclear weapons test. India's subsequent refusal to give up its nuclear weapons and sign the nuclear Nonproliferation Treaty (NPT) has kept it largely outside the system of regulated transfer, trade, and monitoring of nuclear technology that has been developed over the last three decades.

The July agreement requires the United States to amend its own laws and policies on nuclear technology transfer and to work for changes in international controls on the supply of nuclear fuel and technology so as to allow "full civil nuclear energy cooperation and trade with India." In exchange, India's government would identify and separate civilian nuclear facilities and programs from its nuclear weapons complex and volunteer these civilian facilities for International Atomic Energy Agency (IAEA) inspection and safeguarding. Yet, as they consider the deal and ways to transform its broad framework into legal realities, political elites in each country have ignored some crucial issues.

Policy analysts in the United States have debated the wisdom of the deal.[3] This debate has been rather narrow, confined to proliferation policy experts and a few interested members of Congress, and largely focused on the lack of specific details with regard to the deal, the order of the various steps to be taken by the respective governments, and the potential consequences for U.S. nonproliferation policy.[4] The larger policy context of a long-standing effort to co-opt India as a U.S. client and so sustain and strengthen U.S. power, especially with regard to China, has gone unchallenged. There is also little recognition of how the agreement could allow India to expand its nuclear arsenal.

The deal has incited a wider and more intense debate in India on questions of national security, sovereignty, development, and democracy. Some would like to see as few constraints as

[1] *Arms Control Today*, January/February 2006.

[2] Zia Mian is a research scientist in the program on science and global security at Princeton University's Woodrow Wilson School and M. V. Ramana is a faculty member at the Centre for Interdisciplinary Studies in Environment and Development in Bangalore, India.

[3] See George Perkovich, "Faulty Promises: The U.S.-India Nuclear Deal," *Policy Outlook*, September 2005; Fred McGoldrick et al., "The U.S.-India Nuclear Deal: Taking Stock," *Arms Control Today*, October 2005; and Wade Boese, " U.S. Puts Onus on India for Nuclear Ties," *Arms Control Today*, December 2005.

[4] See "Issues and Questions on July 18 Proposal for Nuclear Cooperation With India" at www.armscontrol.org (Nov. 18, 2005, letter to members of Congress).

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possible on increasing the future capacity of India's nuclear weapons complex, and others question the extent to which nuclear energy can help meet India's energy needs. Despite the many claims that the social, economic, and political well-being of the people of India will be enhanced by this deal, there has been little attention paid to the issue of whether India needs nuclear weapons at all, the costly failures of the Indian nuclear energy enterprise, and the possible harm for the people of India from a continued expansion of the nuclear complex.

Misplaced U.S. Goals

The nuclear deal has to be seen in the context of efforts over the last 50 years to incorporate India into U.S. strategy in Asia. After the Chinese revolution, the United States came quickly to believe that newly independent India was the only potential regional power that could compete with China for dominance in Southeast Asia. Despite repeated U.S. efforts to use economic and military aid to promote this policy, India's first prime minister, Jawaharlal Nehru, refused to have his country play this role. He said that a free India would not be a pawn for great powers, and warned that this kind of alliance building by great powers was bad for international relations and could lead to war.[1]

Still, U.S. hostility toward Communist China led to some extraordinary ideas about nuclear cooperation. In the wake of China's first nuclear weapons test in 1964, senior officials in the Department of State and the Pentagon considered the possibilities of "providing nuclear weapons under U.S. custody" to India and preparing Indian forces to use them. At the same time, the U.S. Atomic Energy Commission was considering helping India with "peaceful nuclear explosions," which would involve the use of U.S. nuclear devices under U.S. control being exploded in India.[2] These plans were dropped amid growing fears of the consequences of proliferation for U.S. military and diplomatic power, and the United States turned instead to preventing the further spread of nuclear weapons.

The end of the Cold War prompted a rethinking of strategic possibilities and a now infamous 1992 draft Defense Planning Guidance prepared for then-Secretary of Defense Dick Cheney, which declared that "[o] ur first objective is to prevent the re-emergence of a new rival. This is a dominant consideration underlying the new regional defense strategy." It noted, "We must maintain the mechanisms for deterring potential competitors from even aspiring to a larger regional or global role."[3] In other words, the geopolitical order was to be frozen as it then was, with the United States assured of maintaining its relative superiority in the different regions of the world. A key concern was China.

The first dramatic change in Indo-U.S. relations came during a March 2000 visit by President Bill Clinton to India, less than two years after India's 1998 nuclear tests. The governing coalition then was dominated by the Hindu nationalist Bharatiya Janata Party (BJP), whose views are strongly anti-Communist, aggressively pro-nuclear weapons, and opposed to the more traditional strategy of nonalignment. The joint statement issued by the two leaders declared that " India and the United States will be partners in peace, with a common interest in and complementary responsibility for ensuring regional and international security. We will engage in regular consultations on and work together for strategic stability in Asia and beyond."

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[1] See Robert J. McMahon, *The Cold War on the Periphery* (New York: Columbia University Press, 1994).

[2] George Perkovich , *India 's Nuclear Bomb: The Impact on Global Proliferation* (Berkeley, Calif.: University of California Press, 1999).

[3] "Excerpts From Pentagon's Plan: Prevent the Re-Emergence of a New Rival," *The New York Times*, March 8, 1992.

Further developing the idea of the United States and India as strategic partners in managing regional and international security, the "Next Steps in Strategic Partnership," signed in January 2004, announced that the United States would help India with its civilian space programs, high-technology trade, missile defense efforts, and civilian nuclear activities. The subsequent nuclear deal is but one of the building blocks promised in this larger arrangement. The purpose of the 2004 accord was made clear by a U.S. official who said the "goal is to help India become a major world power in the 21st century.… We understand fully the implications, including military implications, of that statement."[1] These implications became clearer with the U.S.-India Defense Relationship Agreement of June 28, 2005. The thinking behind this agreement was explained by Robert Blackwill, who served in the first George W. Bush administration as U.S. ambassador to India and then as deputy national security adviser for strategic planning. In a rhetorical question, Blackwill asked, "Why should the U.S. want to check India's missile capability in ways that could lead to China's permanent nuclear dominance over democratic India?"[2] Less than a month later, the nuclear deal was announced.

Recruiting India may help reduce the immediate costs to the United States of exercising its military, political, and economic power to limit the growth of China as a possible rival. More generally, the United States sees Asia as central to global politics after the demise of the Soviet Union, and it needs strong regional clients there. The search for allies and friends is all the more important at a time when the United States was criticized because of its invasion and occupation of Iraq. On all these counts, India is seen as a major prize, and support for its military buildup and its nuclear complex seems to be the price the Bush administration is willing to pay.

This goal is, it seems, to be pursued regardless of how it will spur the spiral of distrust, political tension, and dangerous, costly, and wasteful military preparedness between the United States and China, between China and India, and between India and Pakistan. This last dynamic is already coming into view, as Pakistan has demanded from the United States (and been refused) the same deal as is being offered to India, and China wants any exemptions for international nuclear cooperation and trade to be offered not only to India but to be open to others, i.e., its ally, Pakistan.[3] In all these countries, containing about one in three people on the planet, many of whom are very poor, this will amount to a tragic distortion of values and priorities.

An Errant Debate in India

Although the nuclear deal has incited a limited policy debate in the United States, it has become a key concern in Indian domestic politics and has elicited three broad positions. First, there are the nuclear hawks who oppose the deal. They see the nuclear energy and nuclear weapons programs as one more or less integrated complex. They see the deal, particularly the proposed separation of civilian and nuclear facilities, as imposing constraints that would make more difficult the creation of a large nuclear arsenal, which they believe is essential for India to be a "great power." The clearest expression of this view has come from former Prime Minister Atal Behari Vajpayee and others in the BJP.

Vajpayee has argued that "[s]eparating the civilian from the military would be very difficult, if not impossible.… It will also deny us any flexibility in determining the size of our nuclear de-

[1] " U.S. Unveils Plans to Make India 'Major World Power,'" Agence France Presse, March 26, 2005.

[2] Robert Blackwill, "A New Deal for New Delhi," *Wall Street Journal*, March 21, 2005.

[3] Mark Hibbs, " China Favors NSG Solution on India That Facilitates Trade With Pakistan," *Nuclear Fuels*, November 7, 2005.

terrent." The "flexibility" he desires is the ability to use what may be classified as civilian facilities to increase the pace at which the nuclear weapons program could grow, as well as its eventual size. Similar sentiments have also been voiced by some retired officials from the nuclear complex.

The second position is that of Singh and many other leaders of the Congress Party, which heads the coalition currently governing India. They see the deal as offering recognition of India as a nuclear-weapon state, pointing out that the joint statement says India will have "the same benefits and advantages as other leading countries with advanced nuclear technology, such as the United States." More practically, they see it as a way to sustain and expand the nuclear energy program while not restricting the building of what they describe as a "minimum" nuclear weapons arsenal. Even though Indian nuclear strategists and policymakers have never defined the term "minimum," it is used to suggest that India is being restrained in its nuclear ambitions. At the same time, it is made clear that the minimum could increase, depending on circumstances.

Singh explained to the Indian parliament on July 29, 2005, that the deal offers a way whereby "our indigenous nuclear power program based on domestic resources and national technological capabilities would continue to grow," with the expected international supply of nuclear fuel, technology, and reactors serving to "enhance nuclear power production rapidly." At the same time, he made it clear that "there is nothing in the joint statement that amounts to limiting or inhibiting our strategic nuclear weapons program." As an assurance that India would have the final say in implementing the deal, the prime minister announced that, "before voluntarily placing our civilian facilities under IAEA safeguards, we will ensure that all restrictions on India have been lifted."

A different source of opposition to the deal comes from India's left-wing parties, which otherwise support the Congress-led government. These parties have traditionally supported the nuclear energy program, but they opposed the 1998 nuclear weapons test and have pressed for India to play a larger role in global disarmament efforts and to do more to reduce nuclear dangers in the region. Their greatest concern is that the deal ties India too closely to U.S. policies. India's Communist Party leader, Prabodh Panda, said in parliament that the recently concluded agreements with Washington served to reduce India to a "junior partner of the U.S. in fulfilling its global ambitions." As the first sign of India surrendering its traditional nonalignment and role in representing the Third World, they cite the Indian government's surprising vote for a U.S.-led resolution against Iran at the September 2005 IAEA Board of Governors meeting, something key U.S. lawmakers and officials had made clear was tied to the nuclear deal.[1]

These positions, which have by and large dominated the debate so far, have many flaws. The first is their shared belief in the success of India's nuclear energy program and the need to continue with and expand this effort. This fails to recognize that the deal, in fact, marks U.S. acceptance of a long-standing Indian demand for lifting international restrictions on nuclear cooperation and that this demand is itself testament to the failures of the Department of Atomic Energy.

The second problem is the belief shared by the hawks and the government that nuclear weapons are a source of security. They ignore the essential moral, legal, and criminal questions of what it means to have and be prepared to use nuclear weapons. The only difference between these two camps is on the character and number of the nuclear weapons to which they aspire

[1] Wade Boese, "U.S.-Indian Nuclear Prospects Murky," *Arms Control Today*, October 2005.

and how many people in how many cities they are prepared to threaten to kill. The left-wing parties are more ambiguous; they support disarmament but have not called for India unilaterally to give up its nuclear weapons arsenal and ambitions. Some of them even feel Indian nuclear weapons may be needed to hedge against a more belligerent U.S. exercise of power and influence.

Standing outside the political parties is a broad network of social movements in India that have become an increasingly important element in its political life. The most prominent of these, the National Alliance of Peoples Movements, an umbrella group of several hundred organizations and campaigns that support the rights of the poor, women, minorities, farmers, and workers, has come out against the deal because they see it as having been concluded without any public debate; as strengthening an unaccountable, dangerous, and costly Indian nuclear energy and nuclear weapons program; and as undermining important nuclear nonproliferation and disarmament goals.[1]

Nuclear Energy Failures

On the Indian side, a primary motivation for the deal has been the history of failure of its Department of Atomic Energy to produce large quantities of nuclear electricity. In 1962, Homi Bhabha, the founder of India's nuclear program, predicted that by 1987 nuclear energy would constitute 20,000-25,000 megawatts of installed electricity-generation capacity.[2] His successor as head of the Department of Atomic Energy, Vikram Sarabhai, predicted that by 2000 there would be 43,500 megawatts of nuclear power.[3] Neither of these predictions came true.

Despite more than 50 years of generous funding, nuclear power currently amounts to only 3,300 megawatts, barely 3 percent of India's installed electricity capacity. Indian nuclear capacity is expected to rise by more than 50 percent over the next few years, largely because of two 1,000-megawatt reactors purchased from the Soviet Union in a 1988 deal and now being built by Russia. Even if more such deals were to be made in the future, it is by no means clear that India's nuclear establishment will be able to keep its promises, let alone contribute a significant fraction of projected electricity demand.

Another of the Department of Atomic Energy's failures has been in ensuring sufficient supplies of uranium to fuel its nuclear reactors. As an Indian official stated in an interview with the BBC, "The truth is we were desperate. We have nuclear fuel to last only till the end of 2006. If this agreement had not come through, we might have as well closed down our nuclear reactors and by extension our nuclear program."[4] This is not a new crisis; the former head of the atomic energy regulatory board has reported that "uranium shortage" has been "a major problem…for some time."[5]

India has been unable to import uranium for its unsafeguarded nuclear reactors because of the rules of the 45-member Nuclear Suppliers Group (NSG), the countries that manage international nuclear trade with a view to preventing proliferation. Apart from two very old imported U.S. reactors, India relies on natural uranium-fueled nuclear reactors, which are based on the two Canadian-designed and -built pressurized heavy-water reactors it acquired in the 1960s.

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[1] 10. Sandeep Pandey, "Condemnation of India-U.S. Nuclear Deal," Statement by the National Alliance of People's Movements, October 26, 2005.

[2] David Hart, *Nuclear Power in India: A Comparative Analysis* (London: George Allen & Unwin, 1983).

[3] Vikram Sarabhai, *Science Policy and National Development* (Delhi: Macmillan, 1974).

[4] Sanjeev Srivastava, "Indian PM Feels Political Heat," British Broadcasting Corp., July 26, 2005.

[5] A.Gopalakrishnan, "Indo-U.S. Nuclear Cooperation: A Nonstarter?" *Economic and Political Weekly*, July 2, 2005

The total electric capacity of these reactors is 2,990 megawatts. At 75 percent capacity, these require nearly 400 tons of uranium every year. The plutonium production reactors, CIRUS and Dhruva, which are earmarked for nuclear weapons purposes, consume perhaps another 30-35 tons annually. We estimate that current uranium production within India is less than 300 tons of uranium a year, well short of the fuel requirements.

The Department of Atomic Energy has been able to continue to operate its reactors by using uranium stockpiled from when its nuclear capacity and thus its fuel needs were much smaller. Our estimates are that, without the nuclear deal, this stockpile would be exhausted by 2007. The department's desperate efforts to open new uranium mines in the country have met with stiff resistance, primarily because of the health impacts of uranium mining and milling on the communities around existing mines.[1]

For decades, the department has offered the potential shortage of domestic uranium as justification for a plutonium-fueled fast-breeder reactor program, which has involved costly and hazardous reprocessing facilities to recover plutonium from spent nuclear fuel. Its efforts to build a breeder, however, have not made much progress: the Fast Breeder Test Reactor started functioning in 1985 and has been plagued with problems while the Prototype Fast Breeder Reactor is not expected to be completed until 2010 if all goes accordingly to plan. Poor economics and safety and engineering problems have effectively killed such breeder reactor programs in the United States, France, and Germany, but India may choose to try to follow the example of Japan and proceed with its program, ignoring both the costs and risks of reprocessing and the many problems with breeder reactors.

The dismal state of India's nuclear energy complex, despite 50 years of determined government support and funding, may offer the clearest proof yet of one of the basic assumptions underlying the NPT. The treaty recognized that developing countries would need a great deal of help if they were to establish nuclear energy for peaceful purposes successfully. That is why Article IV of the treaty calls for a trade-off: providing non-nuclear-weapon states with access to international cooperation with nuclear energy in return for a demonstrated commitment not to develop nuclear weapons. In refusing to sign the NPT and in developing nuclear weapons, India had until now sacrificed the benefits of this international support. Now, through the nuclear deal, the United States has promised India all the help it needs for its civilian nuclear program, all without signing the treaty or even accepting any limits on its nuclear arsenal.

How Many Bombs Are Too Many?

In particular, the deal promises to allow India access to the international uranium market. If the deal goes through, New Delhi will be able to purchase the uranium it needs to fuel those reactors it chooses to put under IAEA safeguards. This will free up its domestic uranium for its nuclear weapons program and other military uses and would allow a significant and rapid expansion in India's nuclear arsenal. India is believed to have a stockpile of perhaps 40-50 nuclear weapons, with fissile materials stocks for as many more, and plans that reportedly involve an arsenal of 300-400 weapons within a decade.[2] Realizing these plans will require the production of much larger quantities of fissile material and at much higher rates than India has

[1] 15. Xavier Dias, "DAE's Gambit," *Economic and Political Weekly*, August 6, 2005, pp. 3567-3569.

[2] See "India's Nuclear Forces, 2005," *Bulletin of the Atomic Scientists*, September/October 2005, pp. 73-75; David Albright, "India's Military Plutonium Inventory, End 2004," Institute for Science and International Security, May 2005.

achieved so far. Such production of fissile materials specifically for nuclear weapons is not constrained by the deal.

India could use its newly unallocated domestic uranium to meet its fissile material needs in several ways. It could choose to build a large plutonium-production reactor to add to CIRUS and Dhruva, its two weapons-grade plutonium-production reactors at the Bhabha Atomic Research Centre in Bombay. CIRUS and Dhruva could continue to produce about 25-35 kilograms of weapons-grade plutonium a year. Another Dhruva-sized production reactor could yield an additional several bombs worth of such plutonium each year.

Another way in which India could increase its fissile material stockpile is to expand its small-scale centrifuge enrichment program and make highly enriched uranium (HEU) for nuclear weapons. So far, it is only believed to have enriched its domestic uranium to make fuel for the nuclear submarine that has been under development since the 1970s and has recently completed testing of its nuclear reactor.[1] India could make HEU both for weapons and enriched fuel for its submarine if it no longer needs to rely on domestic uranium to fuel its power reactors.

There is also the possibility, as hinted at by some hawkish critics, that India's nuclear power reactors may become part of the weapons complex. For instance, if kept out of safeguards and with sufficient uranium supplies on hand, power reactors could be used to make weapons-grade plutonium by limiting the time the fuel is irradiated. Run this way, a typical 220-megawatt pressurized heavy-water reactor could produce 150-200 kilograms per year of weapons-grade plutonium when operated at 60-80 percent capacity. This could mean as much as an eightfold increase in the existing rate of plutonium production. The penalty to be paid in terms of the increased and less efficient use of uranium would be covered by access to imported uranium to be used in other power reactors. There would no longer be a trade-off between uranium for electricity generation and weapons plutonium production.

Neither does the deal constrain how India uses the weapons-useable materials produced so far. A major source of such weapons-useable material is the plutonium in the spent fuel of the unsafeguarded Indian power reactors. Over the years, some 9,000 kilograms of reactor-grade plutonium may have been produced in these reactors, though a large fraction of this plutonium is probably still not separated from the spent fuel. Even though it has a slightly different mix of the plutonium isotopes from the weapons-grade plutonium normally used for weapons, reactor-grade plutonium can be used to make a nuclear explosive.[2] The United States conducted a nuclear test in 1962 using plutonium that was not of weapons grade, and one of India's May 1998 nuclear tests is reported to have involved such material.[3] An estimated 8 kilograms of such plutonium is needed to make a simple nuclear weapon. If this spent fuel is not put under safeguards as part of the deal, India would have enough plutonium from this source alone for an arsenal of approximately 1,100 weapons, larger than that of all the nuclear-weapon states except the United States and Russia.

Finally, the fast-breeder reactor under construction also will be a source of plutonium. The Department of Atomic Energy has always resisted placing the breeder program under international safeguards and is doing so again when asked to do so as part of the deal. Anil Kakodkar,

[1] "ATV Project: India Crosses Major Milestone," *The Hindu*, November 25, 2005.

[2] J. Carson Mark, "Explosive Properties of Reactor-Grade Plutonium," *Science and Global Security*, Vol. 4, No. 1, 1993, pp. 111-124.

[3] George Perkovich , India 's Nuclear Bomb: The Impact on Global Proliferation (Berkeley, Calif.: University of California Press, 1999).

chairman of the Atomic Energy Commission and secretary of the Department of Atomic Energy, has said that the Prototype Fast Breeder Reactor will not be under safeguards because it is a research and development program and "any research and development programme, we are not going to put under safeguards." He has also pointed out that "only that which is clearly of no national security significance, only that part will be civilian."[1] The department's resistance to safeguards on the breeder program begs the question as to whether this is or ever was intended only for civilian purposes.

Why Nuclear Electricity?

Both Indian and U.S. supporters of the deal claim that the growth of nuclear energy generation capacity in India is a practical and even a necessary way to maintain India's current rate of economic growth. The evidence suggests otherwise.

According to our estimates, the cost of producing nuclear electricity in India is higher than the non-nuclear alternatives.[2] Construction costs are high, and construction times are long, making the capital cost of a nuclear reactor very high when compared, for example, to coal-based thermal stations. In a country where there are multiple demands on capital for infrastructure projects, including for electricity generation, this makes nuclear power a poor economic choice.

Other considerations that go against nuclear power are the possibility of catastrophic accidents and the problem of nuclear waste. In studying the safety of nuclear reactors and other hazardous technologies, sociologists and organization theorists have come to the pessimistic conclusion that serious accidents are inevitable with such complex high-technology systems. The character of these systems makes accidents a "normal" part of their operation, regardless of the intent of their operators and other authorities. In India, as elsewhere, there have been many small accidents at nuclear facilities. Given its high population density, a nuclear reactor accident in India involving the release of large quantities of radioactive materials could cause tremendous damage. Finally, there remains the problem that no country has resolved: the disposal of large amounts of waste that will remain radioactive for many tens of thousands of years.

The issue that really needs to be discussed but has hardly figured in the debate is whether India needs any nuclear power plants at all. There are many who believe India would be better off giving up this costly and dangerous technology and finding ways to meet the needs of its people that do not threaten their future or their environment.

A 2003 study by the Confederation of Indian Industry found that there is great scope for improving Indian energy intensity (energy consumption per unit of gross domestic product), which is high compared to other countries, and called for increased cooperation with the United States in this area. It has been estimated that Indian industry could save as much as 20-30 percent of its total energy consumption and that nearly 30,000 megawatts, i.e., more than the total planned nuclear capacity by 2020, could be saved through energy conservation programs.[3] This would also be cheaper than building new generating capacity, especially additional nuclear capacity. This study also noted that, in the 1999 Indo-U.S. Joint Statement on Cooperation in Energy and Related Environmental Aspects, India had declared a goal of a 10

[1] T. S. Subramaniam, "Identifying a Civilian Nuclear Facility Is India's Decision," *The Hindu*, August 12, 2005.

[2] M. V. Ramana et al., "Economics of Nuclear power From Heavy Water Reactors," *Economic and Political Weekly*, April 23, 2005, pp. 1763-1773.

[3] . V. Raghuraman and Sajal Ghosh, "Indo-U.S. Cooperation in Energy-Indian Perspective," Confederation of Indian Industry, 2003.

percent share for renewable energy by 2012 and a 15 percent improvement in energy efficiency by 2008 and was seeking U.S. help to meet these targets.

The real challenge facing India is the growing divide between the energy-intensive pattern of development of its cities, with increasing demands for electricity and petroleum, and the continuing dependence on fuel-wood and animal-dung energy by the majority who live in its many villages. Nuclear energy as a large, centralized, and costly source of electricity will do little for meeting the basic energy needs of rural India because connecting these areas to a central power grid is expensive, involves high transmission losses, and is financially unsustainable. The UN Development Program's World Energy Assessment in 2000 observed that "past efforts to deliver modern energy to rural areas have often been ineffective and inefficient" and that, "above all, planning for rural energy development should have a decentralized component and should involve rural people—the customers—in planning and decision-making."[1] By working with the rural poor, it may be possible at last to develop and provide the small-scale, local, sustainable, and affordable energy systems that they need.

Conclusion

If approved by Congress and India's parliament as well as the NSG, the U.S.-Indian nuclear deal will prove costly and dangerous. It will feed a cascade of mistrust, insecurity, and instability, diverting resources to a fateful military competition that will envelop China, India, Pakistan, and the United States. More broadly, it is difficult to see the deal as anything other than a fundamental rejection of the nonproliferation regime, as it abandons the assumption that access to nuclear fuel and technology must be within the terms of the regime. It undermines the aspirations of the vast majority of nations seeking global and regional nuclear disarmament.

The deal also will create the potential for the rapid buildup of a much larger Indian nuclear arsenal. It will bail out a failing Indian nuclear energy program that has had little regard either for the economics or the environmental and health consequences of its activities. It is also likely to offer little real benefit to India's poor. It is not often that so much harm may be done to so many by so few.

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2. EDITORIAL ADVISORY: "India's Choice, Congress' Responsibility"[2]

President Bush is expected to travel soon to India where he and Prime Minister Singh will discuss their July 18 proposal for U.S.-Indian nuclear cooperation. The controversial deal calls for "full" civil nuclear cooperation for the first time since India's 1974 nuclear test explosion, which demonstrated that New Delhi was willing to use "civilian" technology assistance to build nuclear weapons and was determined not to join the 1968 nuclear Nonproliferation Treaty (NPT).

Based on the outcome of those discussions, Bush is expected to formally ask Congress to approve changes in U.S. nonproliferation laws and international rules that currently restrict the export and licensing of nuclear and dual-use materials and technologies to nonmembers of the NPT that do not accept comprehensive, "full-scope" nuclear safeguards.

The following editorial published in the Jan.-Feb. 2006 issue of "Arms Control Today" argues that the arrangement could also violate one of the most fundamental principles of the global

[1] . "Rural Energy in Developing Countries," in World Energy Assessment: Energy and the Challenge of Sustainability (UN Department of Economic and Social Affairs and World Energy Council, 2000.)
[2] Arms Control Association "E-Update," January 12, 2006.

nonproliferation system: Article I of the NPT stipulates that states shall “not in any way” assist the nuclear weapons programs of others.

To avoid such an outcome, Congress, the International Atomic Energy Agency, and other responsible states should insist on permanent, facility-specific safeguards on a mutually agreed and broad list of current and future Indian civilian nuclear facilities, and they must also secure a commitment from India to halt the production of fissile materials, as the five original nuclear-weapon states have done.

The views expressed are those of the author and do not necessarily reflect those of the directors or members of the Association. It is available for publication, quotation, and background information.

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3. Congress Approves India Nuclear Bill

By REUTERS
Published: December 9, 2006

WASHINGTON (Reuters) - The U.S. Congress early on Saturday took a major step toward permitting the sale of American-made nuclear reactors and fuel to India by giving final approval to a White House-backed bill.

The Senate approved the measure unanimously following its passage late on Friday by the House of Representatives, 330-59. It now goes to President George W. Bush for his signature.

The Bush administration and its allies contend that civil nuclear commerce to expand electricity generation in India will foster a broad range of ties with the world’s largest democracy -- a rising South Asian power -- and open up billions of dollars in trade for U.S. companies.

Critics decried the bill as a historic mistake that would undermine U.S. efforts to curb the spread of nuclear weapons.

Other critical approvals -- by Congress a second time, the International Atomic Energy Agency and the 45-nation Nuclear Suppliers Group -- are needed before the agreement can take effect. That will not happen before some time next year.

Republican Rep. Henry of Illinois, chairman of the House International Relations Committee, voiced hope the measure will mark ``the beginning of a new and ever-closer relationship between the world’s two largest democracies, the United States and India.”

The deal reverses 30 years of U.S. policy that, until July 2005, opposed nuclear cooperation with India because the country developed nuclear weapons in contravention of international standards and never signed the Non-proliferation Treaty, or NPT.

A multi-million dollar lobbying campaign by India and the U.S. Chamber of Commerce was largely successful in preventing Congress from adding non-proliferation requirements Delhi found too burdensome or unfair.

But chief congressional sponsors said the legislation -- a compromise between competing House and Senate versions -- does include some restraints.

For one thing, it ensures that if India tests another nuclear device as in 1998, Bush ``must terminate all export and re-export of U.S.-origin nuclear materials” to India, they said in a written report.

CRITIC SAYS DEAL A MISTAKE

But Democratic Rep. Edward Markey of Massachusetts charged that the deal is a "historic mistake which will come back to haunt the United States and the world" and underscores what he said was the hypocrisy of American policy.

He noted that even as Washington seeks to sell nuclear technology to India -- which never signed the NPT -- it is working to halt the nuclear program of Iran, which did sign the NPT.

"The United States expects the rest of the world to listen to us (on Iran) while we selectively grant exceptions to countries that never signed the NPT," Markey added.

As lead signatory of the NPT, the United States has been obligated to forswear assistance to the nuclear programs of states that did not sign the treaty.

Experts say India has already produced about 50 nuclear weapons and plans to reach up to 400 in a decade. Many fear selling India U.S.-origin fuel for civilian energy use will free up New Delhi's indigenous uranium stocks for weapons.

The compromise retained a Senate ban on enrichment, reprocessing and heavy water production cooperation with India.

Under pressure from New Delhi, negotiators softened a requirement that U.S. presidents certify India is actively cooperating in restraining Iran's nuclear program as a condition of nuclear cooperation with the United States.

The new provision requires presidents to report annually to Congress on India's performance on this matter but would not end nuclear cooperation if India fails to meet expectations.

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4. Bush signs US-India nuclear bill[1]

The deal will give India access to US civilian nuclear technology. US President George W Bush has signed into law a nuclear deal with India, which ends a three-decade ban on US nuclear trade with Delhi.

The landmark agreement was approved by the US Congress nearly a week ago.

The deal will give India access to US civilian nuclear technology and fuel in return for inspections of its civilian, but not military, nuclear facilities.

India says the accord is vital to meet its rising energy needs. Critics say it creates a dangerous precedent.

They say it effectively allows India to expand its nuclear power industry without requiring it to sign the Non-Proliferation Treaty (NPT) as other nations must.

The US restricted nuclear co-operation with India after it tested a nuclear weapon in 1974.

'Natural partners'

[1] BBC 8 October 2008. India has 14 reactors in commercial operation and nine under construction. Nuclear power supplies about 3% of India's electricity. By 2050, nuclear power is expected to provide 25% of the country's electricity. India has limited coal and uranium reserves. Its huge thorium reserves - about 25% of the world's total - are expected to fuel its nuclear power programme long-term. *Source: Uranium Information Center.*

At a White House signing ceremony, President Bush said: “This agreement sends a signal to the world: Nations that follow the path to democracy and responsible behaviour will find a friend in the United States of America.”

He said: “Even though the United States and India are separated by half the globe, we are natural partners as we head into the 21st Century.”

The US Secretary of State, Condoleezza Rice, and Indian Foreign Minister, Pranab Mukherjee, are expected to formally sign the overall bilateral nuclear co-operation accord on Friday.

It was first agreed three years ago and is regarded as a key foreign policy priority for both the Indian and US governments. Indian Prime Minister Manmohan Singh has said the deal will help India to liberate itself from “the constraints of technology denial of 34 years”.

Although India has said it retains the right to conduct nuclear tests, the US has said the deal would be cancelled in such an eventuality.

The US Senate approved the deal in a 86-13 vote last week. The House of Representatives earlier passed the agreement by 298-117 votes.

The Nuclear Suppliers Group (NSG) recently lifted a ban that had denied India access to the international nuclear market. India and France have also signed a major co-operation pact which paves the way for the sale of French nuclear reactors to Delhi.

France is the world’s second largest producer of nuclear energy after the United States. Russia has also been lobbying the Indian government hard on behalf of its firms.

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Review

The Secrets of the Bomb

By Jeremy Bernstein

Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran and North Korea

by Jeffrey T. Richelson

Norton, 702 pp., $34.95

"What is the answer to the atom bomb? The answer to an atom bomb is an atom bomb, nothing else."

—Atal Bihari Vajpayee, of the Indian BJP, 1996

1.

In 1944, when the atomic project was well underway, if I went to the bar in the La Fonda Hotel in Santa Fe I might have seen some physicists I would recognize. For example, Robert Serber, one of Oppenheimer's closest associates, and his wife were sent to Santa Fe to plant the rumor that what was going on at Los Alamos had to do with submarines. I am not sure how much one would have learned by monitoring their conversations with other physicists, since they used a code when talking about the nuclear bomb project. Uranium-235 was called "25" and plutonium-239 was known as "49." These were the fissionable isotopes. Niels Bohr was known as "Nicholas Baker" and Enrico Fermi was known as "Henry Farmer." Los Alamos was known as "Project Y" and the plutonium bomb was known as the "gadget."

By the fall of 1945, such deceptions would have been futile. All the details involved in making the plutonium bomb, the gadget, were known to the Russians. They were revealed basically by a single agent on the ground— Klaus Fuchs. Fuchs, for example, was able to reveal the secret of making plutonium usable for atomic weapons, a secret the Russians would have had considerable difficulty discovering for themselves. Plutonium is the most complex element in the periodic table. It does not occur naturally, and it has to be not only manufactured but also put into metal form before it can be used in an explosive chain reaction. This is what produced the explosion that took place at Nagasaki. Plutonium comes in at least six different crystalline forms—allotropes—that manifest themselves at different temperatures. At room temperature the so-called alpha phase is found. You can't easily make a metal out of it. On the other hand, at high temperatures there is the delta phase from which you can make a very useful metal; but it relapses to the alpha phase when it cools, so it is very difficult to use.

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At Los Alamos there was a brilliant British-born metallurgist named Cyril Smith who had made a career in the brass business, in which alloys are central to making different products. By trial and error he found that if you alloyed plutonium with gallium it stabilized the delta phase, and you could make a plutonium metal. From that day to this, no one knows why gallium works or what the stability of the alloy is over a very long period, something that is important for storing warheads. The use of this alloy is a crucial bit of information that is absolutely essential in the manufacture of plutonium-based nuclear weapons, and Fuchs was in a position to pass it on. When the Russian physicists learned his identity they nicknamed him Santa Klaus.

Fuchs, the son of a Lutheran minister, had been born in Rüsselsheim, Germany, in 1911. As a student he joined the German Communist Party and when the Nazis came to power he left Germany. He managed to get to Bristol University where he got his Ph.D. in 1937. When the war came, he was interned in Canada as an enemy alien but Max Born, one of his professors, got him released. He was then approached by Rudolf Peierls, who made the first calculation of the "critical mass" needed to make a uranium bomb, to work on nuclear weapons. From the time the Germans invaded Russia, Fuchs began giving information to the Soviets about the bomb. When Peierls joined the British delegation to Los Alamos, Fuchs was asked to go along. Recently, a remarkable letter to Peierls from James Chadwick who headed the British delegation to Los Alamos has emerged, in which he describes Fuchs's reluctance to go. He thought that he could be more useful to the project staying in England. If he had, the subsequent history of the Russian atomic bomb might have been quite different. Once at Los Alamos Fuchs was at the center of the work. He knew everything and transmitted what he knew through the courier named Harry Gold.

The people at Los Alamos liked him. He was a solitary man, worked hard, and was always available as a baby sitter when the more sociable scientists needed one. After the war, the British were not allowed to take classified documents with them. In Fuchs's case it didn't matter, since he had a photographic memory and memorized the final design of the gadget, which he saw tested at Alamogordo. This was the same bomb design that destroyed Nagasaki a month later. In October of 1945, a report was delivered to Lavrenty Beria, whom Stalin had put in charge of the Russian bomb program, spelling all of this out. Of the plutonium it says, "The element plutonium of delta-phase with specific gravity 15.8 is the active material of the atomic bomb."[1] It is equally specific about the rest of the design.

How this information aided the Russians is a matter of some disagreement. Beria did not share it freely with the scientists. He probably did not entirely trust the source. There was at least one other source, a young physicist named Theodore Hall who also transmitted material independently from Los Alamos. The Soviet scientists were given information that surely had an effect. What the spies said about plutonium metallurgy and the use of gallium must have saved months of trial and error.

In any event, the first atomic bomb the Russians tested—which they called "First Lightning" and the US called "Joe 1"—was exploded on August 29, 1949. It was a duplicate of the gadget. The US intelligence services were caught completely off-guard. The Americans had no agent on the ground in the USSR and relied on a monitoring system using aircraft alleged to

[1] For the full text see http://nuclearwea- ponarchive.org/News/Voprosy2.html.

be on routine weather patrols. The planes were equipped to collect radioactive samples of the kind that a reactor accident or a nuclear explosion would produce. Until this data was collected and analyzed, which took several weeks, there was considerable disbelief—including that of President Truman—that the Russians had really tested an atomic bomb. Once it was verified that they had, the cold war nuclear arms race was on. Fuchs was identified in 1950 and served nine years in prison in Great Britain. He was allowed to return to Germany, and died there in 1988.

The reader may wonder why I have not mentioned the hydrogen bomb and any part that Fuchs might have had in the Soviet program to make it. So much of the relevant information is still classified that it is very difficult to arrive at a complete accounting of his contribution. In the case of the fission bomb this is possible because the relevant material is unclassified. We know that what Fuchs did was to supply the Russians with a blueprint of the plutonium implosion bomb that was tested at Alamogordo and dropped on Nagasaki. The Russians then copied this blueprint. Fuchs left Los Alamos in 1946 to return to England where he had an important part in the development of British nuclear weapons.

This took place before there was a breakthrough in the American hydrogen bomb program, owing to the work in 1951 of Stanislaw Ulam and Edward Teller. Nonetheless, Fuchs had been active in hydrogen bomb work before he left the US. In 1946, he and the Hungarian-born mathematician John von Neumann took out a patent on what they thought was a design for a hydrogen bomb.

Such a bomb gets its energy from the fusion of light elements—possibly but not necessarily hydrogen—to make other light elements, with the consequent release of energy. This is the process that makes stars shine. From the beginning of the war, a number of scientists realized that if this process could be duplicated, one could make a weapon of almost limitless energy. The trick was to heat the fusible elements to temperatures like those of the interior of the sun. This was to be done in two steps by using the energy from a fission bomb. First, one had to "ignite" the fusing light elements; second, once ignited, the fusion reaction had to "propagate"—i.e., maintain the ignited state. This latter process was the hard part, and all the designs up to those of Ulam and Teller resulted in a cooling-off before they could propagate. This problem was not solved by Fuchs and von Neumann, but they did propose a novel form of ignition, which was a forerunner of the Teller-Ulam design, and this is what Fuchs gave to the Russians. There is no consensus on the extent to which the Russians used it; but there is increasing agreement that it was of significant help to their program.

2.

I thought of all of this when I read the fascinating new book *Spying on the Bomb* by Jeffrey T. Richelson, a senior fellow at the privately funded National Security Archive and the author of other books on military intelligence. While some of this material has been available in other sources, it has never been put together so comprehensively. He has also interviewed some of the participants. The book begins with an account of US attempts during World War II to learn what the Germans were doing and goes on to describe its efforts to obtain information about the nuclear programs of the Iraqis, North Koreans, South Africans, Israelis, and Iranians. The one common theme is that if you do not have both agents on the ground and competent people to interpret what they have uncovered, you are playing a game of blindman's bluff with very high stakes indeed.

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So far as I know, the Germans never tried very hard to learn about our nuclear program. I think that they simply did not take seriously the possibility that the US had one. In the early summer of 1945, ten German nuclear scientists were confined in a manor house outside Cambridge, England, and their conversations recorded. When the bombing of Hiroshima was announced, their collective initial reaction was disbelief. On the other hand, we took the possibility of a German program very seriously. It was the British who first concluded from limited intelligence that there was no crash program in Germany to build a bomb. Professor Peierls told me that he was convinced of this because he had got hold of catalogs of courses in German universities and saw that the usual people were teaching the usual physics courses.

However, in the fall of 1943 there was a scare. That summer a German nuclear physicist named Hans Jensen had visited Bohr in Copenhagen. Jensen was not part of the German nuclear program but was close to people who were. He brought to Bohr news of what Werner Heisenberg and the people around him seemed to be doing. Bohr obtained from Jensen a drawing of something that he took to be a nuclear weapon. Who made this drawing was never clear. In October of 1943, Bohr escaped to England carrying with him the information he had learned from Jensen. In December of 1943, Bohr came to the United States and was debriefed by General Leslie Groves, who was in charge of the bomb project. He showed Groves the drawing and Groves became extremely exercised. He insisted that Oppenheimer stop everything he was doing and convene a meeting of experts in Los Alamos as soon as Bohr arrived. In the 1970s I was able to contact the scientists who had attended this meeting and were still alive, including Bohr's son Aage, Hans Bethe, and Edward Teller. Teller told me that he had no recollection of the meeting but Bethe told me that he took one look at the drawing and saw that it was the drawing of a reactor.[1] His first thought was that the Germans must be crazy. Apparently, he thought, they wanted to drop a reactor on London. What neither he nor any of the rest of those at the meeting realized was that the Germans were not crazy at all. By 1940, they understood that you could use plutonium as a nuclear explosive and that this was made in reactors. They never succeeded in making a workable reactor but they knew what to do with one.

In the fall of 1943, General Groves authorized the creation of an intelligence mission that was to follow the troops across Europe and learn once and for all what the Germans had done to produce nuclear weapons. The mission was called Alsos and its scientific leader was the Dutch-born physicist Samuel Goudsmit. By Christmas of 1944, Goudsmit had seen enough to be sure that the Germans never had a workable program. In his book he was somewhat derisive about their efforts. He even, quite incorrectly, chided Heisenberg for failing to realize that plutonium was a possible nuclear explosive. That Goudsmit could make a mistake like this shows just how difficult it is to gather and interpret intelligence.

Richelson has much to say about the report of an alleged nuclear explosion that could never be confirmed. His story depends not on eyewitnesses but on information from “Vela” satellites, i.e., those equipped with a “bhangmeter”—an optical sensor that can register light fluctuations that last no longer than one thousandth of a second. Such meters are crucial in detecting the initial flash of a plutonium bomb explosion, which lasts only about a thousandth of a second. What is interesting about this episode is that while some kind of explosion was thought to have taken place on September 22, 1979, there is still no agreement about what it was. No

[1] The late Robert Serber gave me copies of the documents, including a letter from Oppenheimer to Groves that described the meeting and included a list of participants.

eyewitnesses have been found. On that day a Vela satellite detected the two light events that are characteristic of an atmospheric nuclear explosion. The satellite was not equipped to detect the precise location of the presumed explosion, although later it was established that the light flashes were at a spot in the Indian Ocean near Prince Edward Island.

Up to that point, the Vela satellites had an impeccable record for detecting nuclear explosions, so it was natural to assume that this is what it was. But who set it off? There were two possible candidates, Israel and South Africa, and perhaps the two jointly. Although the Israeli program was by then well known, few realized that South Africa also had a nuclear weapons program, one that it finally abandoned in 1991 when it signed the nuclear nonproliferation treaty, which opened the program up to international inspections.

Apart from South Africa having sold some uranium to Israel, it was never established what the connections, if any, between the Israeli and South African programs may have been. Later on, in September of 1979, US experts concluded that South Africa did not have enough weapons-grade nuclear material for a bomb, but in 1979, this still was regarded as a possibility. If either Israel or South Africa had actually tested a weapon this would have had very serious diplomatic consequences, so it was decided that the Vela information had to be examined very carefully. A high-powered panel of experts was assembled under the direction of Jack Ruina, a professor of electrical engineering at MIT. The Vela satellite in question was running past its expected lifespan at the time of the detection, so that its results were suspect.

The general conclusion of the panel was that there was reason to be wary of the Vela results.[1] However, there were other observations involving ocean acoustic waves and disturbances in the ionosphere that might indicate that a nuclear explosion had occurred. Still, no radioactive fallout was observed. That it was a solo Israeli test seemed implausible since that would have involved a naval expedition, which seemed beyond Israel's capacity. As far as I can tell, the prevailing opinion is that the Vela satellite observed something else, although it is not clear what this was. This again illustrates the proposition that without agents such as Fuchs and Hall in place, reliable information is hard to come by, especially if the country in question is both clever and deceitful. When it came to nuclear weapons, the Israelis exhibited both of these qualities.

The Israeli program is nearly as old as the state itself. Ben-Gurion authorized it in 1952. The Israelis soon developed new methods for extracting heavy water from ordinary water and for transforming uranium into a gaseous form so that it can be enriched and used as fuel for an explosion. They managed to interest the French in this project, and Israeli physicists started to visit Saclay, outside Paris, which was the center of the French nuclear program. When he visited the US, I met the late Amos de Shalit, a very distinguished Israeli theoretical nuclear physicist who, after spending some time at MIT, worked at Saclay for four months. I was always tempted to ask him if he had picked up any tips about nuclear weapons from such MIT scientists as Victor Weiskopf who were both Los Alamos veterans and supporters of Israel. I never could quite bring myself to do it. On the other hand, I did have a chance to talk about nuclear matters with Benjamin Netanyahu at a small social gathering in New York. This was long before he became an important member of the Israeli government. I was introduced to him as someone who had worked in nuclear physics and had been a summer intern at Los Alamos. Not surprisingly, the subject of the Israeli bomb came up. He told me that if the sur-

[1] I am grateful to Richard Garwin, who was a member of the panel, for discussions.

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vival of the country was at stake, the Israelis would use it and worry about the consequences later.

In the late 1950s, with French assistance, the Israelis had begun to construct a large reactor in the Negev and a facility for processing the fuel rods needed to make plutonium. Then, in 1959, De Gaulle became president of France and said French assistance could continue only if Ben-Gurion gave public assurance that the reactor would be used solely for peaceful purposes. This he did, while knowing full well that the reactor was going to be used to make plutonium for nuclear weapons. The reactor was completed in 1963. During this time the Israelis and the Americans engaged in a kind of theater of the absurd. The Americans demanded inspections and the Israelis came up with one ingenious maneuver after another to avoid them. For example, the Americans were informed that the nuclear complex at Dimona was a textile factory. Before he was assassinated, President Kennedy and his experts came close to a finding that a nuclear reactor was being used to make plutonium. The Israelis went on maintaining the fiction that they had not manufactured nuclear weapons. What brought an end to this farce was the testimony of an immigrant Moroccan Jew named Mordechai Vanunu.

In 1977, after a short course in the essentials of atomic weapons production, Vanunu got a job as manager in the graveyard shift at the nuclear plant, working between 11:30 PM and 8:00 AM. Vanunu's clearance gave him access to all levels of secure sites at the plant, including those in which materials that might be used for a hydrogen bomb were manufactured. Vanunu was a political activist who attended rallies at which both Communists and Arabs were present. He was warned not to involve himself in such political matters, but he kept on doing so until 1985, when he was fired. He went to London with his story of Israel's nuclear program and photographs to back it up. These were published in the London *Sunday Times* and created a sensation. Vanunu was lured to Rome by a young woman, an Israeli agent, and kidnapped by the Mossad; he was taken back to Israel where he spent the next seventeen years in prison, partly in harsh solitary confinement. He is now living under tight security in Israel. It was clear from what he revealed, Richelson writes, that Israel, which has been making nuclear weapons for decades, has a very considerable and varied nuclear arsenal.

About the Chinese, Indian, Pakistani, and Iraqi programs, Richelson points out that what they all have in common is that foreign intelligence failed badly to detect them, a failure caused in part by the successful deception practiced by these countries. In the Iraqi case, American and other intelligence services failed twice to find out about its nuclear progress. After the Israeli air raid that destroyed Iraq's so-called Tammuz 1 reactor in June of 1981, foreign intelligence agencies assumed that the Iraqi program had been successfully stopped. As far as the manufacture of plutonium was concerned this was largely true. But the Iraqis had a very sizable program to separate uranium isotopes that had not been affected by the raid. They also had a group of bomb designers equally unaffected. Neither of these had been detected by American intelligence. Only after the first Gulf War, and after a good deal of resistance by the Iraqis, were international inspectors finally able to pin down the extent of the program. They concluded that if it had not been interrupted it might have produced a bomb within a year or so. In short, Saddam Hussein's abortive invasion of Kuwait had an unintended consequence of depriving him of a nuclear weapon.

The misreading of the intelligence before the latest Iraq war has been much discussed, but a reader who wants a compact summary will find it in Richelson's book. What the reader will not find is an explanation of why Saddam Hussein gave up the program in the early 1990s yet did not fully cooperate with the inspectors who would have verified that he had done so. If he had supplied adequate information at first, the war might well have been avoided; he might have reconstituted the program, although I have seen no hard evidence that he planned to do so. If inspections had been allowed to continue under Mohamed ElBaradei and Hans Blix in 2003, as many nations preferred, the absence of nuclear weapons and other weapons of mass destruction would have been increasingly clear, and in Blix's view war would probably have been avoided. What has been hardly mentioned in the controversy over whether Saddam Hussein might have revived a nuclear program is Blix's statement in his book *Disarming Iraq* that while he informed the Security Council that "neither governments nor inspectors would want disarmament inspection to go on forever," he reminded that Council that, after verified disarmament, a sustained inspection and monitoring system was to remain in place to strike an alarm if there was any sign of revival of forbidden weapons programs.[1]

In his failure to make full disclosure, Saddam Hussein's worst enemy was Saddam Hussein. He may, Blix and others have speculated, have been reluctant to admit that he didn't have the weapons with which to intimidate Iran and others in the region.

As for the Indians and Pakistanis, they simply lied about their intentions. The US had no informants on the ground, so when they tested their first nuclear weapons Americans were taken by surprise. Until 1959 the Russians and the Chinese collaborated on nuclear development, and Chinese scientists were sent to the Soviet Union to learn about nuclear technology. The Russians had agreed to supply the Chinese with fissionable material and, more remarkably, with a sample bomb and the plans that went with it. But then the two countries had a falling out and the cooperative program was stopped before any samples arrived. The Chinese were on their own. US intelligence services made a very substantial effort to follow developments, but they assumed incorrectly that, like the other countries, the Chinese were going to make a plutonium bomb, so they made an unsuccessful search, mainly from the air, for nuclear reactors that would produce plutonium. Not finding any, they came to the conclusion that no Chinese bomb was imminent.

The Chinese, however, had decided to make a uranium bomb but one with a novel design. In a bomb the fissionable material passes through three stages; subcritical, critical, and supercritical. In the subcritical stage fissions do take place but they do not produce a self-sustaining chain reaction. When the material becomes critical the chain reactions become self-sustaining and when it goes super-critical the material becomes explosive. In the Hiroshima bomb what happened was that a subcritical mass was fired into another mass, producing first a critical and then a super-critical mass. This device was not tested before it was used at Hiroshima.

When the plutonium bomb was first considered, scientists proposed to use the same design. But when the first plutonium was delivered to Los Alamos from the reactors in Hanford, Washington, it was found to contain an unwanted isotope of plutonium that spontaneously fissioned. This could set off the fission reaction in the bomb before enough material was assembled, thus producing a "fizzle." Thus a different method was needed. This consisted of imploding a sphere of plutonium by wrapping shaped high explosives around it. This worked much faster and solved the isotope problem. What the Chinese did was to use implosion for

[1] Hans Blix, *Disarming Iraq* (Pantheon, 2004), p. 210.

their uranium bomb, which they exploded on October 16, 1964. This design was much more efficient than the one the US used at Hiroshima, so it used less fissionable material. The test again caught our intelligence services totally by surprise.

The last part of Richelson's book deals with Iran and North Korea. Here events, especially in Iran, are moving so quickly that Richelson's account has to be supplemented by information released by the International Atomic Energy Agency and reported by the press. Of the two countries, in my view, the prospects of an Iranian bomb are the more serious. The North Koreans probably have a small, untested nuclear arsenal. My guess is that sooner or later, under Chinese and other international pressure, Kim Jong-il may accept an offer of economic and other rewards in return for giving up his nuclear program. Meanwhile, the principal concern about the North Koreans is that they do not try to sell their technology to terrorists. They may have little else to sell.

What makes the Iranian situation so difficult is that they have oil to sell, which makes them less vulnerable to economic sanctions. Indeed, when they are threatened the price of oil tends to go up, making the Iranians richer. The Chinese at the moment get about 14 percent of their oil from Iran, which is why they are so unwilling to apply pressure. To add to the difficulties, the Iranian president often speaks of eliminating Israel, although it is a question whether he has the authority to try to do so. In any case, if the Iranians eventually make one or more bombs, the logic of mutual deterrence would apply: use of the bomb against Israel would very likely result in a disaster for Iran. Meanwhile, the Israelis seem to mean it when they say they would not allow the Iranians to have nuclear weapons; the Iranians, one can surmise, are as aware of this as anyone else, just as they must be aware of the alleged American contingency plans for an attack on Iran recently reported by Seymour Hersh.[1]

The themes of this review have been twofold. In order to have really reliable intelligence about the atomic program of a foreign country a necessary, but not sufficient, condition is to have agents on the ground. In the examples I have given the necessity is clear. Countries can hide their nuclear programs even from satellites and other sophisticated detection instruments. The Chinese hid their program because the satellites were looking for the wrong signals. Until Vanunu, an agent on the ground, unmasked the Israeli program the Israelis hid it by deception. But even with an agent on the ground mistakes can be made. Samuel Goudsmit was selected as the scientific leader of the Alsos mission in part because he did not know anything about ours. He often said that if he had been captured by the Germans he could not have told them anything. Since he did not know about our plutonium program, he did not look for the German program and made the erroneous assertion that there was none.

The second theme is that in almost all cases the predictions have erred on the side of conservatism. Countries have acquired nuclear weapons well before they were supposed to. The example of the Russians is the most graphic. This happened because Fuchs gave them a blueprint for the US plutonium bomb and the Russians had the technological capacity to follow it more or less literally. With the Iranians we are almost in the worst possible case. We do not, it seems, have agents on the ground so not only do we not know what they have done—except for what they have chosen to tell us—but we do not even know their technological capacities. To take an example, it is rumored that the Pakistani nuclear merchant A.Q. Khan has sold

[1] See *The New Yorker,* April 17, 2006.

them the plans for an implosion bomb. As the people at Los Alamos discovered, making an implosion bomb was a very difficult technological feat that required the enormous assembled talents of almost the entire laboratory. Do the Iranians have the people to do this, even if they have the plans? We simply do not know.

What we do know is that the Iranians have had a nuclear energy program for many years. We know that in the fall of 2002, the Russians began assembling a large nuclear reactor at the port city of Bushehr. This reactor has not yet been put into operation. It is what is called a "light water" reactor, which means that it uses ordinary water as a coolant. Such a reactor cannot operate with natural uranium— the kind you get out of a mine. It has to be enriched. How is this done? Like all elements, uranium comes in several isotopes. The isotopes differ from each other in the number of electrically neutral particles—neutrons—in their nuclei. The number of positively charged particles in the nucleus—protons—is the same for all these isotopes. This means that it is extraordinarily difficult to separate these isotopes chemically. Methods must be employed that take advantage of the tiny differences in mass between the nuclei of the isotopes. Soon after fission was discovered in 1938 Niels Bohr realized that it was the isotope uranium-235—i.e., with 235 particles in its nucleus—that was fissioning. But in natural uranium, which consists mostly of uranium-238, only 0.7 percent consists of uranium-235. Bohr understood how difficult it would be to separate these isotopes by physical means and declared that nuclear weapons were practically impossible because it would take resources on a national scale to carry out this separation. He was roughly right about that, but wrong about the impossibility.

There are a number of ways in which the separation can be carried out, all of them difficult. During World War II most of the separation was done using electromagnetic fields. If you put a charged particle in a magnetic field it will have its orbit deflected by an amount that depends on the mass of the particle. This was what was done at Oak Ridge where the wartime separation of uranium-235 was carried out. To have an idea of what was involved, the Hiroshima uranium bomb consisted of two subcritical parts. The "target" within the bomb consisted of 38.4 kilograms of 80 percent enriched uranium while the "projectile" that was designed to hit the target inside the bomb consisted of 25.6 kilograms of 80 percent enriched uranium. This design was considered to be such a sure thing that it was never tested before it was dropped on Hiroshima. If the Iranians can make a uranium implosion bomb of the kind that the Chinese first tested, they would need only between fifteen and twenty kilograms of highly enriched uranium.

The Iranians have chosen to do this enrichment by using centrifuges. These are long cylinders stacked in parallel. The cylinders can rotate at 50,000 to 70,000 rotations per minute. Uranium is introduced in the cylinder in the form of a very corrosive gas—uranium hexafluoride—and it is estimated that by late February of 2006 the Iranians had produced about eighty-five metric tons of uranium in this gaseous form. It would take about five metric tons of this uranium gas to produce enough enriched uranium to make one bomb.[1] This assumes an implosion bomb.

In the centrifuge the heavier isotope, uranium-238, is spun to the outside leaving the lighter isotope, uranium-235, in the middle. This residue can be used as the stock for the next stage of

[1] This estimate can be found in David Albright and Cory Hinderstein, "The Clock Is Ticking, But How Fast?" *Isis*, March 27, 2006.

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enrichment, which is why the centrifuges are connected together in what is called a cascade. Once one obtains say a 50 percent enrichment, going to a full weapons-grade enrichment requires much less effort.[1]

So far this is mainly physics with a minimum of speculation. What is largely speculation is how far the Iranians have gotten with the enrichment process. It has been known for some time that they have had 164 so-called P-1 centrifuges in a cascade in their facility in Natanz in central Iran. "P-1" is short for "Pakistan-1." Beginning in 1997, they were supplied by the A.Q. Khan network. If remnants of this network are still operating they may still be active in Iran.

Since August of 2005 the Iranians have been running the Natanz centrifuges without external inspection or supervision. Very recently they announced that they had enriched some uranium of the type that can be used in a reactor. Normally this means an enrichment of about 3 percent. This would be consistent with the claim of the Iranians that the only use they will make of enriched uranium is for nuclear electrical power. But no external observer has been allowed to see how much and to what percent. We simply do not know. The rotors of the P-1 centrifuges are constructed from aluminum. But there is a next generation —the P-2— which is made out of a specialized steel. These are much more efficient. In some of their statements the Iranians have talked about making a cascade of 54,000 P-2 centrifuges. If this very difficult task can be achieved— and we don't know just how long it would take—and the cascade can be kept running for a year, the Iranians will have enough material to make more than one nuclear weapon.

—April 26, 2006

[1] I am grateful to Norman Dombey, Carey Sublette, and Peter Zimmerman for many very helpful comments and suggestions about this.

Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean

OPEN FOR SIGNATURE IN MEXICO CITY: 14 FEBRUARY 1967
ENTRY INTO FORCE:
DEPOSITARY: MEXICO

Preamble

In the name of their peoples and faithfully interpreting their desires and aspirations, the Governments of the States which sign the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean;

Desiring to contribute, so far as lies in their power, towards ending the armaments race, especially in the field of nuclear weapons, and towards strengthening a world at peace, based on the sovereign equality of States, mutual respect and good neighborliness;

Recalling that the United Nations General Assembly, in its Resolution 808 (IX), unanimously adopted as one of the three points of a coordinated programme of disarmament "the total prohibition of the use and manufacture of nuclear weapons and weapons of mass destruction of every type";

Recalling that militarily denuclearized zones are not an end in themselves but rather a means for achieving general and complete disarmament at a later stage;

Recalling United Nations General Assembly Resolution 1911 (XVIII), which established that the measures that should be agreed upon for the denuclearization of Latin America and the Caribbean should be taken "in the light of the principles of the Charter of the United Nations and of regional agreements";

Recalling United Nations General Assembly Resolution 2028 (XX), which established the principle of an acceptable balance of mutual responsibilities and duties for the nuclear and non-nuclear powers, and

Recalling that the Charter of the Organization of American States proclaims that it is an essential purpose of the Organization to strengthen the peace and security of the hemisphere,

Convinced:

That the incalculable destructive power of nuclear weapons has made it imperative that the legal prohibition of war should be strictly observed in practice if the survival of civilization and of mankind itself is to be assured;

That nuclear weapons, whose terrible effects are suffered, indiscriminately and inexorably, by military forces and civilian population alike, constitute, through the persistence of the radioactivity they release, an attack on the integrity of the human species and ultimately may even render the whole earth uninhabitable;

That general and complete disarmament under effective international control is a vital matter which all the peoples of the world equally demand;

That the proliferation of nuclear weapons, which seems inevitable unless States, in the exercise of their sovereign rights, impose restrictions on themselves in order to prevent it, would make any agreement on disarmament enormously difficult and would increase the danger of the outbreak of a nuclear conflagration;

That the establishment of militarily denuclearized zones is closely linked with the maintenance of peace and security in the respective regions;

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That the military denuclearization of vast geographical zones, adopted by the sovereign decision of the States comprised therein, will exercise a beneficial influence on other regions where similar conditions exist;

That the privileged situation of the Signatory States, whose territories are wholly free from nuclear weapons, imposes upon them the inescapable duty of preserving that situation both in their own interests and for the good of mankind;

That the existence of nuclear weapons in any country of Latin America and the Caribbean would make it a target for possible nuclear attacks and would inevitably set off, throughout the region, a ruinous race in nuclear weapons which would involve the unjustifiable diversion, for warlike purposes, of the limited resources required for economic and social development;

That the foregoing reasons, together with the traditional peaceloving outlook of Latin America and the Caribbean, give rise to an inescapable necessity that nuclear energy should be used in that region exclusively for peaceful purposes, and that the Latin American and Caribbean countries should use their right to the greatest and most equitable possible access to this new source of energy in order to expedite the economic and social development of their peoples,

Convinced finally:

That the military denuclearization of Latin America and the Caribbean -being understood to mean the undertaking entered into internationally in this Treaty to keep their territories forever free from nuclear weapons- will constitute a measure which will spare their peoples from the squandering of their limited resources on nuclear armaments and will protect them against possible nuclear attacks on their territories, and will also constitute a significant contribution towards preventing the proliferation of nuclear weapons and a powerful factor for general and complete disarmament, and

That Latin America and the Caribbean, faithful to their tradition of universality, must not only endeavor to banish from their homelands the scourge of a nuclear war, but also strive to promote the well-being and advancement of their peoples, at the same time co-operating in the fulfillment of the ideals of mankind, that is to say, in the consolidation of a permanent peace based on equal rights, economic fairness and social justice for all, in accordance with the principles and purposes set forth in the Charter of the United Nations and in the Charter of the Organization of American States,

Have agreed as follows:

Article 1: Obligations

1. The Contracting Parties hereby undertake to use exclusively for peaceful purposes the nuclear material and facilities which are under their jurisdiction, and to prohibit and prevent in their respective territories:

(a) The testing, use, manufacture, production or acquisition by any means whatsoever of any nuclear weapons, by the Parties themselves, directly or indirectly, on behalf of anyone else or in any other way, and

(b) The receipt, storage, installation, deployment and any form of possession of any nuclear weapons, directly or indirectly, by the Parties themselves, by anyone on their behalf or in any other way.

2. The Contracting Parties also undertake to refrain from engaging in, encouraging or authorizing, directly or indirectly, or in any way participating in the testing, use, manufacture, production, possession or control of any nuclear weapon.

Article 2:Definition of the Contracting Parties
For the purposes of this Treaty, the Contracting Parties are those for whom the Treaty is in force.

Article 3:Definition of territory
For the purposes of this Treaty, the term "territory" shall include the territorial sea, air space and any other space over which the State exercises sovereignty in accordance with its own legislation.

Article 4 :Zone of application
1. The Zone of application of this Treaty is the whole of the territories for which the Treaty is in force.
2. Upon fulfillment of the requirements of Article 29, paragraph 1, the Zone of Application of this Treaty shall also be that which is situated in the western hemisphere within the following limits (except the continental part of the territory of the United States of America and its territorial waters) : starting at a point located at 35º north latitude, 75º west longitude; from this point directly southward to a point at 30º north latitude, 75º west longitude; from there, directly eastward to a point at 30º north latitude, 50º west longitude; from there, along a loxodromic line to a point at 5º north latitude, 20º west longitude; from there, directly southward to a point at 60º south latitude, 20º west longitude; from there, directly westward to a point at 60º south latitude, 115º west longitude; from there, directly northward to a point at 0º latitude, 115º west longitude; from there, along a loxodromic line to a point at 35º north latitude, 150º west longitude; from there, directly eastward to a point at 35º north latitude, 75º west longitude.

Article 5: Definition of nuclear weapons
For the purposes of this Treaty, a nuclear weapon is any device which is capable of releasing nuclear energy in an uncontrolled manner and which has a group of characteristics that are appropriate for use for warlike purposes. An instrument that may be used for the transport or propulsion of the device is not included in this definition if it is separable from the device and not an indivisible part thereof.

Article 6: Meeting of Signatories
At the request of any of the Signatory States or if the Agency established by Article 7 should so decide, a meeting of all the Signatories may be convoked to consider in common questions which may affect the very essence of this instrument, including possible amendments to it. In either case, the meeting will be convoked by the Secretary General.

Article 7: Organization
1. In order to ensure compliance with the obligations of this Treaty, the Contracting Parties hereby establish an international organization to be known as the "Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean", hereinafter referred to as "the Agency". Only the Contracting Parties shall be affected by its decisions.
2. The Agency shall be responsible for the holding of periodic or extraordinary consultations among Member States on matters relating to the purposes, measures and procedures set forth in this Treaty and to the supervision of compliance with the obligations arising therefrom.
3. The Contracting Parties agree to extend to the Agency full and prompt co-operation in accordance with the provisions of this Treaty, of any agreements they may conclude with the

Agency and of any agreements the Agency may conclude with any other international organization or body.
4. The headquarters of the Agency shall be in Mexico City.

Article 8: Organs
1. There are hereby established as principal organs of the Agency: a General Conference, a Council and a Secretariat.
2. Such subsidiary organs as are considered necessary by the General Conference may be established within the purview of this Treaty.

Article 9: The General Conference
1. The General Conference, the supreme organ of the Agency, shall be composed of all the Contracting Parties; it shall hold regular sessions every two years, and may also hold special sessions whenever this Treaty so provides or, in the opinion of the Council, the circumstances so require.
2. The General Conference:
   (a) May consider and decide on any matters or questions covered by this Treaty, within the limits thereof, including those referring to powers and functions of any organ provided for in this Treaty.
   (b) Shall establish procedures for the Control System to ensure observance of this Treaty in accordance with its provisions.
   (c) Shall elect the Members of the Council and the Secretary General.
   (d) May remove the Secretary General from office if the proper functioning of the Agency so requires.
   (e) Shall receive and consider the biennial and special reports submitted by the Council and the Secretary General.
   (f) Shall initiate and consider studies designed to facilitate the optimum fulfillment of the aims of this Treaty, without prejudice to the power of the Secretary General independently to carry out similar studies for submission to and consideration by the Conference.
   (g) Shall be the organ competent to authorize the conclusion of agreements with Governments and other international organizations and bodies.
3. The General Conference shall adopt the Agency's budget and fix the scale of financial contributions to be paid by Member States, taking into account the systems and criteria used for the same purpose by the United Nations.
4. The General Conference shall elect its officers for each session and may establish such subsidiary organs as it deems necessary for the performance of its functions.
5. Each Member of the Agency shall have one vote. The decisions of the General Conference shall be taken by a two-thirds majority of the Members present and voting in the case of matters relating to the Control System and measures referred to in Article 20, the admission of new Members, the election or removal of the Secretary General, adoption of the budget and matters related thereto. Decisions on other matters, as well as procedural questions and also determination of which questions must be decided by a two-thirds majority, shall be taken by a simple majority of the Members present and voting.
6. The General Conference shall adopt its own Rules of Procedure.

Article 10: The Council

1. The Council shall be composed of five Members of the Agency elected by the General Conference from among the Contracting Parties, due account being taken of equitable geographic distribution.
2. The Members of the Council shall be elected for a term of four years. However, in the first election three will be elected for two years. Outgoing Members may not be re-elected for the following period unless the limited number of States for which the Treaty is in force so requires.
3. Each Member of the Council shall have one representative.
4. The Council shall be so organized as to be able to function continuously.
5. In addition to the functions conferred upon it by this Treaty and to those which may be assigned to it by the General Conference, the Council shall, through the Secretary General, ensure the proper operation of the Control System in accordance with the provisions of this Treaty and with the decisions adopted by the General Conference.
6. The Council shall submit an annual report on its work to the General Conference as well as such special reports as it deems necessary or which the General Conference requests of it.
7. The Council shall elect its officers for each session.
8. The decisions of the Council shall be taken by a simple majority of its Members present and voting.
9. The Council shall adopt its own Rules of Procedure.

Article 11: The Secretariat

1. The Secretariat shall consist of a Secretary General, who shall be the chief administrative officer of the Agency, and of such staff as the Agency may require. The term of office of the Secretary General shall be four years and he may be re-elected for a single additional term. The Secretary General may not be a national of the country in which the Agency has its headquarters. In case the office of Secretary General becomes vacant, a new election shall be held to fill the office for the remainder of the term.
2. The staff of the Secretariat shall be appointed by the Secretary General, in accordance with rules laid down by the General Conference.
3. In addition to the functions conferred upon him by this Treaty and to those which may be assigned to him by the General Conference, the Secretary General shall ensure, as provided by Article 10, paragraph 5, the proper operation of the Control System established by this Treaty, in accordance with the provisions of the Treaty and the decisions taken by the General Conference.
4. The Secretary General shall act in that capacity in all meetings of the General Conference and of the Council and shall make an annual report to both bodies on the work of the Agency and any special reports requested by the General Conference or the Council or which the Secretary General may deem desirable.
5. The Secretary General shall establish the procedures for distributing to all Contracting Parties information received by the Agency from governmental sources and such information from non-governmental sources as may be of interest to the Agency.
6. In the performance of their duties the Secretary General and the staff shall not seek or receive instructions from any Government or from any other authority external to the Agency and shall refrain from any action which might reflect on their position as international officials responsible only to the Agency; subject to their responsibility to the Agency, they shall not

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disclose any industrial secrets or other confidential information coming to their knowledge by reason of their official duties in the Agency.
7. Each of the Contracting Parties undertakes to respect the exclusively international character of the responsibilities of the Secretary General and the staff and not to seek to influence them in the discharge of their responsibilities.

Article 12: Control System
1. For the purpose of verifying compliance with the obligations entered into by the Contracting Parties in accordance with Article 1, a Control System shall be established which shall be put into effect in accordance with the provisions of Articles 13-18 of this Treaty.
2. The Control System shall be used in particular for the purpose of verifying:
(a) That devices, services and facilities intented for peaceful uses of nuclear energy are not used in the testing or manufacture of nuclear weapons,
(b) That none of the activities prohibited in Article I of this Treaty are carried out in the territory of the Contracting Parties with nuclear materials or weapons introduced from abroad, and
(c) That explosions for peaceful purposes are compatible with Article 18 of this Treaty.

Article 13: IAEA Safeguards
Each Contracting Party shall negotiate multilateral or bilateral agreements with the International Atomic Energy Agency for the application of its safeguards to its nuclear activities. Each Contracting Party shall initiate negotiations within a period of 180 days after the date of the deposit of its instrument of ratification of this Treaty. These agreements shall enter into force, for each Party, not later than eighteen months after the date of the initiation of such negotiations except in case of unforeseen circumstances or force majeure.

Article 14: Reports of the Contracting Parties
1. The Contracting Parties shall submit to the Agency and to the International Atomic Energy Agency, for their information, semi-annual reports stating that no activity prohibited under this Treaty has occurred in their respective territories.
2. The Contracting Parties to the Treaty shall simultaneously transmit to the Agency a copy of the reports submitted to the International Atomic Energy Agency which relate to matters subject of this Treaty that are relevant to the work of the Agency.
3. The information furnished by the Contracting Parties shall not be, totally or partially, disclosed or transmitted to third parties, by the addressees of the reports, except when the Contracting Parties give their express consent.
Article 15: Complementary or supplementary information
1. At the request of any of the Contracting Parties and with the authorization of the Council, the Secretary General may request any of the Contracting Parties to provide the Agency with complementary or supplementary information regarding any extraordinary event or circumstance which affects the compliance with this Treaty, explaining his reasons. The Contracting Parties undertake to co-operate promptly and fully with the Secretary General.
2. The Secretary General shall inform the Council and the Contracting Parties forthwith of such requests and of the respective replies.

Article 16: **Special inspections**
1. The International Atomic Energy Agency has the power of carrying out special inspections in accordance with Article 12 and with the agreements referred to in Article 13 of this Treaty.
2. At the request of any of the Contracting Parties and in accordance with the procedures established in Article 15 of this Treaty, the Council may submit for the consideration of the International Atomic Energy Agency a request that the necessary mechanisms be put into operation to carry out a special inspection.
3. The Secretary General shall request the Director General of the International Atomic Energy Agency to transmit to him in a timely manner the information forwarded to the Board of Governors of the IAEA relating to the conclusion of the special inspection. The Secretary General shall make this information available to the Council promptly.
4. The Council, through the Secretary General shall transmit this information to all the Contracting Parties.

Article 17: Use of nuclear energy for peaceful purposes
Nothing in the provisions of this Treaty shall prejudice the rights of the Contracting Parties, in conformity with this Treaty, to use nuclear energy for peaceful purposes, in particular for their economic development and social progress.

Article 18: Explosions for peaceful purposes
1. The Contracting Parties may carry out explosions of nuclear devices for peaceful purposes - including explosions which involve devices similar to those used in nuclear weapons- or collaborate with third parties for the same purpose, provided that they do so in accordance with the provisions of this Article and the other articles of the Treaty, particularly Articles 1 and 5.
2. Contracting Parties intending to carry out, or to co-operate in carrying out, such an explosion shall notify the Agency and the International Atomic Energy Agency, as far in advance as the circumstances require, of the date of the explosion and shall at the same time provide the following information:

(a) The nature of the nuclear device and the source from which it was obtained,

(b) The place and purpose of the planned explosion,

(c) The procedures which will be followed in order to comply with paragraph 3 of this Article,

(d) The expected force of the device, and

(e) The fullest possible information on any possible radioactive fall-out that may result from the explosion or explosions, and measures which will be taken to avoid danger to the population, flora, fauna and territories of any other Party or Parties.

3. The Secretary General and the technical personnel designated by the Council and the International Atomic Energy Agency may observe all the preparations, including the explosion of the device, and shall have unrestricted access to any area in the vicinity of the site of the explosion in order to ascertain whether the device and the procedures followed during the explosion are in conformity with the information supplied under paragraph 2 of this Article and the other provisions of this Treaty.
4. The Contracting Parties may accept the collaboration of third parties for the purpose set forth in paragraph 1 of the present Article, in accordance with paragraphs 2 and 3 thereof.

Article 19: Relations with the International Atomic Energy Agency
The Agency may conclude such agreements with the International Atomic Energy Agency as are authorized by the General Conference and as it considers likely to facilitate the efficient operation of the Control System established by this Treaty.

Article 20: Relations with other international organizations
1. The Agency may also enter into relations with any international organization or body, especially any which may be established in the future to supervise disarmament or measures for the control of armaments in any part of the world.
2. The Contracting Parties may, if they see fit, request the advice of the Inter-American Nuclear Energy Commission on all technical matters connected with the application of this Treaty with which the Commission is competent to deal under its Statute.

Article 21: Measures in the event of violation of the Treaty
1. The General Conference shall take note of all cases in which, in its opinion, any Contracting Party is not complying fully with its obligations under this Treaty and shall draw the matter to the attention of the Party concerned, making such recommendations as it deems appropriate.
2. If, in its opinion, such non-compliance constitutes a violation of this Treaty which might endanger peace and security, the General Conference shall report thereon simultaneously to the United Nations Security Council and the General Assembly through the Secretary General of the United Nations, and to the Council of the Organization of American States. The General Conference shall likewise report to the International Atomic Energy Agency for such purposes as are relevant in accordance with its Statute.

Article 22: United Nations and Organization of American States
None of the provisions of this Treaty shall be construed as impairing the rights and obligations of the Parties under the Charter of the United Nations or, in the case of State Members of the Organization of American States, under existing regional treaties.

Article 23: Privileges and immunities
1. The Agency shall enjoy in the territory of each of the Contracting Parties such legal capacity and such privileges and immunities as may be necessary for the exercise of its functions and the fulfillment of its purposes.
2. Representatives of the Contracting Parties accredited to the Agency and officials of the Agency shall similarly enjoy such privileges and immunities as are necessary for the performance of their functions.
3. The Agency may conclude agreements with the Contracting Parties with a view to determining the details of the application of paragraphs 1 and 2 of this Article.

Article 24: Notification of other agreements
Once this Treaty has entered into force, the Secretariat shall be notified immediately of any international agreement concluded by any of the Contracting Parties on matters with which this Treaty is concerned; the Secretariat shall register it and notify the other Contracting Parties.

Article 25: Settlement of disputes
Unless the Parties concerned agree on another mode of peaceful settlement, any question or dispute concerning the interpretation or application of this Treaty which is not settled shall be

referred to the International Court of Justice with the prior consent of the Parties to the controversy.

Article 26: Signature

1. This Treaty shall be open indefinitely for signature by:

(a) All the Latin American Republics, and the Caribbean.

(b) All other sovereign States in the western hemisphere situated in their entirety south of parallel 35º north latitude; and, except as provided in paragraph 2 of this Article, all such States when they have been admitted by the General Conference.

2. The condition of State Party to the Treaty of Tlatelolco shall be restricted to Independent States which are situated within the Zone of application of the Treaty in accordance with Article 4 of same, and with paragraph I of the present Article, and which were Members of the United Nations as of December 10, 1985 as well as to the non-autonomous territories mentioned in document OEA/CER.P, AG/doc. 1939/85 of November 5, 1985, once they attain their independence.

Article 27: Ratification and deposit

1. This Treaty shall be subject to ratification by Signatory States in accordance with their respective constitutional procedures.

2. This Treaty and the instruments of ratification shall be deposited with the Government of the Mexican United States, which is hereby designated the Depositary Government.

3. The Depositary Government shall send certified copies of this Treaty to the Governments of Signatory States and shall notify them of the deposit of each instrument of ratification.

Article 28: Reservations

This Treaty shall not be subject to reservations.

Article 29: Entry into force

1. Subject to the provisions of paragraph 2 of this Article, this Treaty shall enter into force among the States that have ratified it as soon as the following requirements have been met:

(a) Deposit of the instruments of ratification of this Treaty with the Depositary Government by the Governments of the States mentioned in Article 26 which are in existence on the date when this Treaty is opened for signature and which are not affected by the provisions of Article 26, paragraph 2;

(b) Signature and ratification of Additional Protocol I annexed to this Treaty by all extracontinental or continental States having de jure or de facto international responsibility for territories situated in the Zone of Application of the Treaty;

(c) Signature and ratification of the Additional Protocol II annexed to this Treaty by all powers possessing nuclear weapons;

(d) Conclusion of bilateral or multilateral agreements on the application of the Safeguards System of the International Atomic Energy Agency in accordance with Article 13 of this Treaty.

2. All Signatory States shall have the imprescriptible right to waive, wholly or in part, the requirements laid down in the preceding paragraph. They may do so by means of a declaration which shall be annexed to their respective instrument of ratification and which may be formulated at the time of deposit of the instrument or subsequently. For those States which exercise

this right, this Treaty shall enter into force upon deposit of the declaration, or as soon as those requirements have been met which have not been expressly waived.
3. As soon as this Treaty has entered into force in accordance with the provisions of paragraph 2 for eleven States, the Depositary Government shall convene a preliminary meeting of those States in order that the Agency may be set up and commence its work.
4. After the entry into force of this Treaty for all the countries of the Zone, the rise of a new power possessing nuclear weapons shall have the effect of suspending the execution of this Treaty for those countries which have ratified it without waiving requirements of paragraph 1, subparagraph c) of this Article, and which request such suspension; the Treaty shall remain suspended until the new power, on its own initiative or upon request by the General Conference, ratifies the annexed Additional

Article 30: Amendments
1. Any Contracting Party may propose amendments to this Treaty and shall submit its proposals to the Council through the Secretary General, who shall transmit them to all the other Contracting Parties and, in addition, to all other Signatories in accordance with Article 6. The Council through the Secretary General, shall immediately following the meeting of Signatories convene a Special Session of the General Conference to examine the proposals made, for the adoption of which a two-thirds majority of the Contracting Parties present and voting shall be required.
2. Amendments adopted shall enter into force as soon as the requirements set forth in Article 29 of this Treaty have been complied with.

Article 31: Duration and denunciation
1. This Treaty shall be of a permanent nature and shall remain in force indefinitely, but any Party may denounce it by notifying the Secretary General of the Agency if, in the opinion of the denouncing State, there have arisen or may arise circumstances connected with the content of this Treaty or of the annexed Additional Protocols I and II which affect its supreme interests or the peace and security of one or more Contracting Parties.
2. The denunciation shall take effect three months after the delivery to the Secretary General of the Agency of the notification by the Government of the Signatory State concerned. The Secretary General shall immediately communicate such notification to the other Contracting Parties and to the Secretary General of the United Nations for the information of the United Nations Security Council and the General Assembly. He shall also communicate it to the Secretary General of the Organization of American States.

Article 32: Authentic texts and registration
This Treaty, of which the Spanish, Chinese, English, French, Portuguese and Russian texts are equally authentic, shall be registered by the Depositary Government in accordance with Article 102 of the United Nations Charter. The Depositary Government shall notify the Secretary General of the United Nations of the signatures, ratifications and amendments relating to this Treaty and shall communicate them to the Secretary General of the Organization of American States for its information.
Transitional Article
Denunciation of the declaration referred to in Article 29, paragraph 2, shall be subject to the same procedures as the denunciation of this Treaty, except that it will take effect on the date of delivery of the respective notification.

In witness whereof the undersigned Plenipotentiaries, having deposited their full powers, found in good and due form, sign this Treaty on behalf of their respective Governments.
Done at Mexico, Distrito Federal, on the fourteenth day of February, one thousand nine hundred and sixty-seven.

Additional Protocol l:
The undersigned Plenipotentiaries, furnished with full powers by their respective Governments,
Convinced that the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, negotiated and signed in accordance with the recommendations of the General Assembly of the United Nations in Resolution 1911 (XVIII) of 27 November 1963, represents an important step towards ensuring the non-proliferation of nuclear weapons,
Aware that the non-proliferation of nuclear weapons is not an end in itself but, rather, a means of achieving general and complete disarmament at a later stage, and
Desiring to contribute, so far as lies in their power, towards ending the armaments race, especially in the field of nuclear weapons, and towards strengthening a world at peace, based on mutual respect and sovereign equality of States,
Have agreed as follows:

Article 1:
To undertake to apply the statute of denuclearization in respect of warlike purposes as defined in Articles 1, 3, 5 and 13 of the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean in territories for which, de jure or de facto, they are internationally responsible and which lie within the limits of the geographical Zone established in that Treaty.

Article 2:
The duration of this Protocol shall be the same as that of the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean of which this Protocol is an annex, and the provisions regarding ratification and denunciation contained in the Treaty shall be applicable to it.

Article 3:
This Protocol shall enter into force, for the States which have ratified it, on the date of the deposit of their respective instruments of ratification.
In witness whereof the undersigned Plenipotentiaries, having deposited their full powers, found in good and due form, sign this Protocol on behalf of their respective Governments.

Additonal Protocol II
The undersigned Plenipotentiaries, furnished with full powers by their respective Governments,
Convinced that the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean negotiated and signed in accordance with the recommendations of the General Assembly of the United Nations in Resolution 1911 (XVIII) of 27 November 1963, represents an important step towards ensuring the non-proliferation of nuclear weapons,
Aware that the non-proliferation of nuclear weapons is not an end in itself but, rather, a means of achieving general and complete disarmament at a later stage, and

Desiring to contribute, so far as lies in their power, towards ending the armaments race, especially in the field of nuclear weapons, and towards promoting and strengthening a world at peace, based on mutual respect and sovereign equality of States,
Have agreed as follows:

Article 1:
The statute of denuclearization of Latin America and the Caribbean in respect of warlike purposes, as defined, delimited and set forth in the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean of which this instrument is an annex, shall be fully respected by the Parties to this Protocol in all its express aims and provisions.

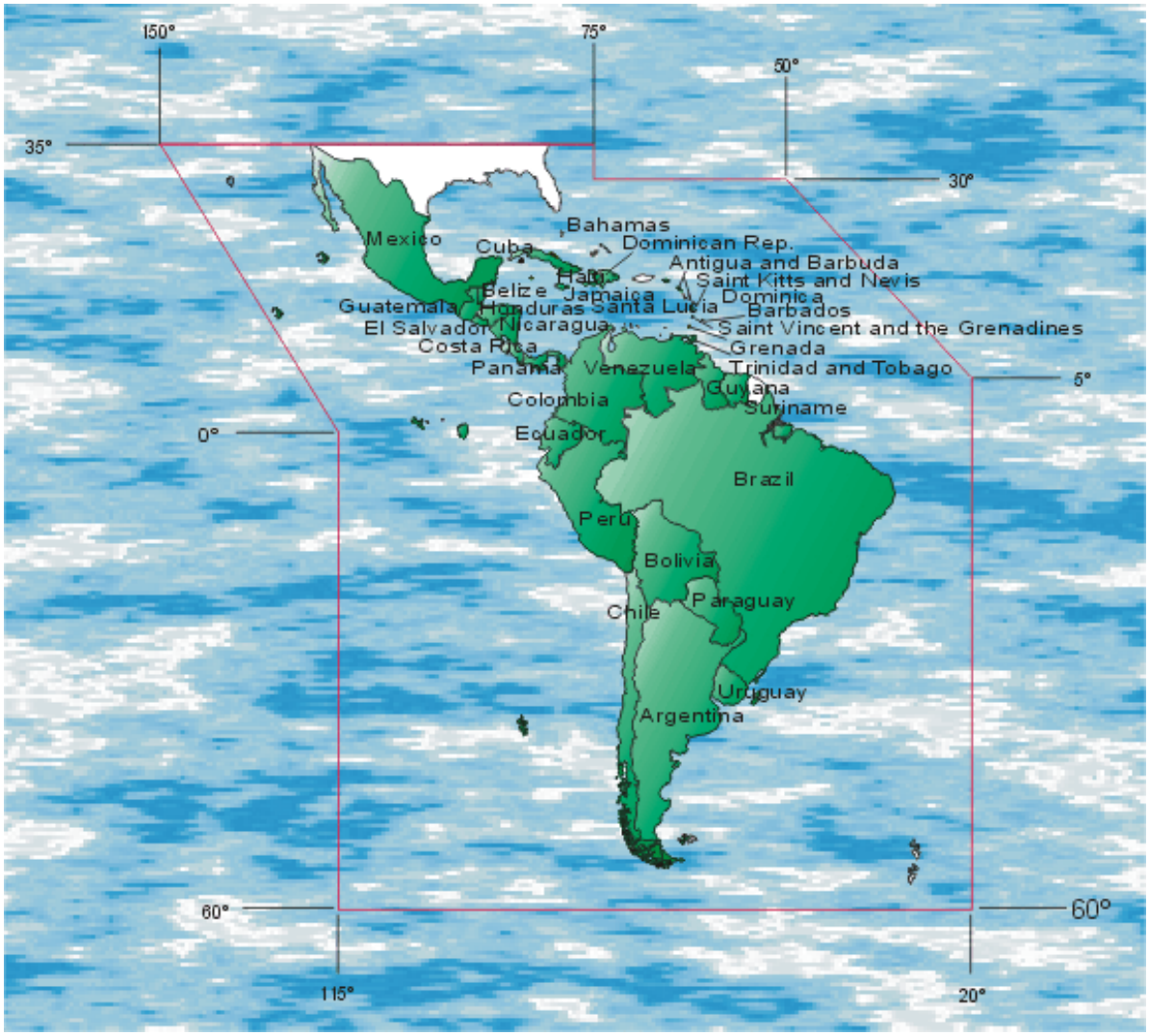
Article 2:
The Governments represented by the undersigned Plenipotentiaries undertake, therefore, not to contribute in any way to the performance of acts involving a violation of the obligations of Article 1 of the Treaty in the territories to which the Treaty applies in accordance with Article 4 thereof.

Article 3:
The Governments represented by the undersigned Plenipotentiaries also undertake not to use or threaten to use nuclear weapons against the Contracting Parties of the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean.

Article 4:
The duration of this Protocol shall be the same as that of the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean of which this Protocol is an annex, and the definitions of territory and nuclear weapons set forth in Articles 3 and 5 of the Treaty shall be applicable to this Protocol, as well as the provisions regarding ratification, reservations, denunciation, authentic texts and registration contained in Articles 27, 28, 31 and 32 of the Treaty.

Article 5:
This Protocol shall enter into force, for the States which have ratified it, on the date of the deposit of their respective instruments of ratification.
In witness whereof, the undersigned Plenipotentiaries, having deposited their full powers found to be in good and due form, hereby sign this Additional Protocol on behalf of their respective Governments.

Map of the Zone of Application of the Treaty of Tlatelolco



The Treaty of Tlatelolco: A Background Note

The Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, known also as the Treaty of Tlatelolco, was opened for signature on 14 February 1967.[1] It has been rightly identified with Mexico in general and Alfonso García Robles in particular. Yet its origins are Brazilian and something more.

By the late 1950s, three interconnected questions were being discussed at the United Nations:

1. Decolonization in general and in particular the European colonies in Africa;
2. The increasing number of States possessing a nuclear-weapon capability or, as it was known then, the "further dissemination of nuclear weapons" or horizontal nuclear proliferation; and
3. The need to prevent further nuclear tests, especially in the atmosphere, for the improvement of existing arsenals or vertical nuclear proliferation.

The decolonization process promoted vigorously by the General Assembly reached its first milestone in 1960 when 17 former colonies, all but one from Africa, joined the United Nations.

That same year, the General Assembly adopted by 68 votes in favor, none against and 26 abstentions[2], a resolution sponsored by Ireland on nuclear non-proliferation:

United Nations General Assembly resolution 1576 (XV)
Prevention of the wider dissemination of nuclear weapons

The General Assembly,

Recalling its resolution 1380 (XIV) of 20 November 1959,

Recognizing the urgent danger that now exists that an increase in the number of States possessing nuclear weapons may occur, aggravating international tension and the difficulty of maintaining world peace, and thus rendering more difficult the attainment of general disarmament agreement,

Noting with regret that the Ten-Nation Committee on Disarmament did not find it possible to consider this problem, which was referred to it by General Assembly resolution 1380 (XIV),

Believing in the necessity of an international agreement, subject to inspection and control, whereby the Powers producing nuclear weapons would refrain from relinquishing control of such weapons to any nation not possessing them and whereby Powers not possessing such weapons would refrain from manufacturing them,

Believing further that, pending the conclusion of such an international agreement, it is desirable that temporary and voluntary measures be taken to avoid the aggravation of this danger,

1. *Calls upon* all Governments to make every effort to achieve permanent agreement on the prevention of the wider dissemination of nuclear weapons;

[1] The Treaty's name was later amended to "Latin America *and the Caribbean*."

[2] Five of the then 99 UN Members were absent: Cameroon, Congo (Brazzaville), Congo (Leopoldville), Mali and Upper Volta. The 26 abstentions were: Australia, Belgium, Bolivia, Brazil, China, Colombia, Dominican Republic, El Salvador, France, Greece, Guatemala, Haiti, Italy, Luxembourg, Netherlands, Nicaragua, Paraguay, Peru, Philippines, Portugal, Spain, Turkey, Union Of South Africa, United Kingdom, United States and Uruguay.
The 68 votes in favor were: Afghanistan, Albania, Argentina, Austria, Bulgaria, Burma, Byelorussian SSR, Cambodia, Canada, Central African Republic, Ceylon, Chad, Chile, Costa Rica, Cuba, Cyprus, Czechoslovakia, Dahomey, Denmark, Ecuador, Ethiopia, Federation Of Malaya, Finland, Gabon, Ghana, Guinea, Honduras, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Israel, Ivory Coast, Japan, Jordan, Laos, Lebanon, Liberia, Libya, Madagascar, Mexico, Morocco, Nepal, New Zealand, Niger, Nigeria, Norway, Pakistan, Panama, Poland, Romania, Saudi Arabia, Senegal, Somalia, Sudan, Sweden, Thailand, Togo, Tunisia, Ukrainian SSR, USSR, United Arab Republic, Venezuela, Yemen and Yugoslavia.

2. *Calls upon* Powers producing such weapons, as a temporary and voluntary measure pending the negotiation of such a permanent agreement, to refrain from relinquishing control of such weapons to any nation not possessing them and from transmitting to it the information necessary for their manufacture;

3. *Calls upon* Powers not possessing such weapons, on a similar temporary and voluntary basis, to refrain from manufacturing these weapons and from otherwise attempting to acquire them.

960th plenary meeting,
20 December 1960.

1960 was also the year that France carried out its first nuclear test. It was on 13 February 1960 at the test site in Reggan in the Sahara Desert in Algeria, then a French Protectorate. At its 1959 session the General Assembly had expressed "its grave concern over the intention of the Government of France to conduct nuclear tests" in the Sahara. That concern was contained in resolution 1379 (XIV) of 20 November 1959[1]. In 1960 negotiations had begun among the United Kingdom, the Soviet Union and the United States for the suspension of testing in the atmosphere and its resolutions 1577 and 1578 (XV) of that year the General Assembly encouraged the parties to conclude successfully those negotiations.

In 1961 the General Assembly decided to begin the process of turning Africa into a nuclear-weapon-free zone, Its resolution 1652 (XVI) was adopted by a vote of 55 in favor, none against and 44 abstentions[2]:

United Nations General Assembly resolution 1652 (XVI)
Consideration of Africa as a denuclearized zone

The General Assembly,

Recalling its resolutions 1378 (XIV) of 20 November 1959 on general and complete disarmament, 1379 (XIV) of 20 November 1959 on the question of French nuclear tests in the Sahara, 1576 (XV) of 20 December 1960 on the prevention of the wider dissemination of nuclear weapons, and 1577 (XV) and 1578 (XV) of 20 December 1960 on the suspension of nuclear and thermo-nuclear tests,

Recalling further its resolution 1629 (XVI) of 27 October 1961, which declared that both concern for the future of mankind and the fundamental principles of international law impose a responsibility on all States concerning actions which might have harmful biological consequences for the existing and future generations of peoples of other States, by increasing the levels of radio-active fall-out,

Concerned about the present rate of nuclear armament and the possible spread of nuclear weapons, as well as the resumption of nuclear tests in the continent of Africa which is being emancipated,

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[1] The resolution was adopted by 51 votes in favor, 16 against and 15 abstentions. Those **in favor**: Afghanistan, Albania, Austria, Bolivia, Bulgaria, Burma, Byelorussian SSR, Cambodia, Canada, Ceylon, Cuba, Czechoslovakia, Denmark, Ecuador, Ethiopia, Federation of Malaya, Finland, Ghana, Guinea, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Japan, Jordan, Lebanon, Liberia, Libya, Mexico, Morocco, Nepal, New Zealand, Norway, Pakistan, Panama, Philippines, Poland, Romania, Saudi Arabia, Sudan, Sweden, Tunisia, Ukrainian SSR, USSR, United Arab Republic, Venezuela, Yemen and Yugoslavia. Those **against**: Belgium, Brazil, Dominican Republic, France, Honduras, Israel, Italy, Luxembourg, Netherlands, Nicaragua, Peru, Portugal, Spain, Union of South Africa, United Kingdom and United States. **Abstentions**: Argentina, Australia, Chile, China, Colombia, Costa Rica, El Salvador, Greece, Guatemala, Haiti, Laos, Paraguay, Thailand, Turkey and Uruguay.

[2] Of the then 103 UN Members four were absent: Ceylon, Dahomey, Dominican Republic and Laos. **In favor**: Afghanistan, Albania, Austria, Brazil, Bulgaria, Burma, Byelorussian SSR, Cambodia, Congo (Leopoldville), Cuba, Cyprus, Czechoslovakia, Denmark, Ethiopia, Federation Of Malaya, Finland, Ghana, Guinea, Haiti, Hungary, Iceland, India, Indonesia, Iran, Iraq, Ireland, Jordan, Lebanon, Liberia, Libya, Mali, Mongolia, Morocco, Nepal, Nigeria, Norway, Pakistan, Philippines, Poland, Romania, Saudi Arabia, Senegal, Sierra Leone, Somalia, Sudan, Sweden, Syria, Thailand, Togo, Tunisia, Ukrainian SSR, USSR, United Arab Republic, Yemen and Yugoslavia. **Abstentions**: Argentina, Australia, Belgium, Bolivia, Cameroon, Canada, Central African Republic, Chad, Chile, China, Colombia, Congo (Brazzaville), Costa Rica, Ecuador, El Salvador, France, Gabon, Greece, Guatemala, Honduras, Israel, Italy, Ivory Coast, Japan, Luxembourg, Madagascar, Mauritania, Mexico, Netherlands, New Zealand, Nicaragua, Niger, Panama, Paraguay, Peru, Portugal, South Africa, Spain, Turkey, United Kingdom, United States, Upper Volta, Uruguay and Venezuela.

Recognizing the need to prevent Africa from becoming involved in any competition associated with the ideological struggles between the Powers engaged in the arms race and, particularly, with nuclear weapons,

Recognizing further that the task of economic and social development in the African States requires the uninterrupted attention of those States in order to allow them to fulfill their goals and to contribute fully to the maintenance of international peace and security,

Calls upon Member States:

(a) To refrain from carrying out or continuing to carry out in Africa nuclear tests in any form;

(b) To refrain from using the territory, territorial waters or air space of Africa for testing, storing or transporting nuclear weapons;

(c) To consider and respect the continent of Africa as a denuclearized zone.

1063rd plenary meeting,
24 November 1961.

Weeks before the Cuban missile crisis of October 1962 Brazil proposed the establishment of a "denuclearized zone" in Latin America.[1] At the beginning of the general debate of the General Assembly on 20 September 1962, the Foreign Minister of Brazil, Afonso Arinos de Melo Franco, referred to nuclear disarmament and nuclear tests and then added: "Brazil also favours, in principle, the establishment of denuclearized zones in the world, provided that proposals to that effect are not merely made for the purposes of the cold war, from which we have always held aloof. Latin America might form such a zone."[2]

For the most part disarmament items are assigned to the General Assembly's First Committee and it was there that the Brazilian delegation submitted a draft resolution on the subject. It was later revised and co-sponsored by Bolivia, Chile and Ecuador (document A/C.1/L. 312 and Rev. 1 and Add. 1).

In introducing the draft resolution to the First Committee on 8 November 1962, Foreign Minister Melo Franco made a statement which was summarized as follows:

> Recent events, which had proved that nuclear weapons had been introduced into Latin America, had prompted Brazil to submit to the First Committee a draft resolution (A/C.1/ L.312) on the denuclearization of Latin America and Africa. In taking that step, Brazil had wished to contribute to the solution not only of a continental crisis which had become a world problem but also of the general problem of disarmament. The Brazilian draft resolutions, which was largely based on General Assembly resolution 1652 (XVI), offered a means by which Latin America and Africa might be withdrawn from the catastrophic nuclear weapons race. Since its submission, Bolivia and Chile had expressed their desire to become sponsors of the draft resolution and the representatives of the United States and Ceylon [now Sri Lanka] had expressed their approval of it. His delegation was consulting with other delegations with as view to drafting a revised text which would take into account of various suggestions, in particular those made by the representatives of African countries.[3]

During the First Committee's general debate a number of delegations referred to the Brazilian draft resolution. Many backed it and a few said they had doubts. Ghana, for example, announced its support and recalled that the country's President "had expressed the hope of see-

[1] The term "denuclearized" was used initially but later modified to "militarily denuclearized" and eventually to "nuclear-weapons-free" zone to ensure that the peaceful uses of nuclear energy were not included.

[2] Brazil has traditionally been the first speaker in the UN General Assembly's annual general debate. Melo Franco spoke in French but the text is from the English summary record A/PV. 1125.

[3] Document A/C.1/SR. 1269 of 8 November 1962, pp. 131-132.

ing Africa, South America and the Caribbean declared nuclear-free zones on the basis of an international convention signed by all States Members of the United Nations."[1]

Nigeria, Burma (now Myanmar), Gabon, Romania, Denmark, Yugoslavia, Syria, Iraq, Ethiopia, Mongolia, Morocco and Indonesia stated that they were in favor.[2] Ukraine also expressed support and recalled the Polish proposal of 14 February 1958 for Central Europe.[3]

Cuba noted that "Although [it] sympathized with the idea of denuclearized zones, it would prefer the whole earth to be denuclearized.[4] Mauritania also expressed doubts regarding the Brazilian proposal, as did Spain, echoing the United States' reservations about the role of the United Nations regarding nuclear-weapon-free zones.[5]

It is important to note that a number of Latin American countries did not refer to the Brazilian proposal in their statements in the First Committee. This is especially surprising in the case of Mexico given its future role in the negotiation of the Treaty of Tlatelolco.[6]

The draft resolution was not put to a vote at the General Assembly that year.

On April 29, 1963, at the initiative of the President of Mexico, the Presidents of five Latin American countries -- Bolivia, Brazil, Chile, Ecuador, and Mexico -- announced that they were prepared to sign a multilateral agreement that would make Latin America a nuclear-weapon-free zone. On November 27, 1963, this declaration received the support of the UN General Assembly in its resolution 1911 (XVIII), adopted by a vote of 91 in favor, none against and 15 abstentions[7].

United Nations General Assembly resolution 1911 (XVIII)
Denuclearization of Latin America

The General Assembly,

Bearing in mind the vital necessity of sparing present and future generations the scourge of a nuclear war,

Recalling its resolutions 1380 (XIV) of 20 November 1959, 1576 (XV) of 20 December 1960 and 1665 (XVI) of 4 December 1961, in which it recognized the danger that an increase in the number of States possessing nuclear weapons would involve, since such an increase would necessarily result in an intensification of the arms race and an aggravation of the difficulty of maintaining world peace, thus rendering more difficult the attainment of a general disarmament agreement,

Observing that in its resolution 1664 (XVI) of 4 December 1961 it stated explicitly that the countries not possessing nuclear weapons had a grave interest and an important part to fulfil in the preparation and implementation of measures that could halt further nuclear weapon tests and prevent the further spread of nuclear weapons,

Considering that the recent conclusion of the Treaty banning nuclear weapon tests in the atmosphere, in outer space and under water, signed on 5 August 1963, has created a favourable atmosphere for parallel progress towards the prevention of the further spread of nuclear weapons, a problem which, as indicated in

[1] Document A/C.1/SR. 1270 of 9 November 1962, p. 135.
[2] Documents A/C.1/SR. 1271-1277 of 12-15 November 1962.
[3] Document A/C.1/SR. 1276 of 15 November 1962.
[4] Document A/C.1/SR. 1257 of 29 October 1962, p. 72. While asserting support for the principle of a nuclear-weapon-free zone, Cuba stipulated certain conditions, including the requirement that Puerto Rico and the Panama Canal Zone be included in the zone, and that foreign military bases, especially Guantanamo Naval Base, be eliminated.
[5] Documents A/C.1/ SR. 1274 and 1276 of 14 and 15 November 1962, respectively.
[6] See statement by Ambassador Luis Padilla Nervo in document A/C.1/SR. 1257 of 29 October 1962, p. 72.
[7] Of the UN's then 111 Member States, five did not participate: Albania, Honduras, Jordan, Laos and Uganda. The 15 abstentions were: Algeria, Bulgaria, Burundi, Byelorussia, Cuba, Czechoslovakia, France, Hungary, Mali, Mongolia, Poland, Tunisia, Ukraine, USSR and Venezuela.

General Assembly resolutions 1649 (XVI) of 8 November 1961 and 1762 (XVII) of 6 November 1962, is closely connected with that of the banning of nuclear weapon tests,

Considering that the Heads of State of five Latin American Republics issued, on 29 April 1963, a declaration on the denuclearization of Latin America in which, in the name of their peoples and Governments, they announced that they are prepared to sign a multilateral Latin American agreement whereby their countries would undertake not to manufacture, receive, store or test nuclear weapons or nuclear launching devices,

Recognizing the need to preserve, in Latin America, conditions which will prevent the countries of the region from becoming involved in a dangerous and ruinous nuclear arms race,

1. *Notes with satisfaction* the initiative for the denuclearization of Latin America taken in the joint declaration of 29 April 1963;

2. *Expresses the hope* that the States of Latin America will initiate studies, as they deem appropriate, in the light of the principles of the Charter of the United Nations and of regional agreements and by the means and through the channels which they deem suitable, concerning the measures that should be agreed upon with a view to achieving the aims of the said declaration;

3. *Trusts* that at the appropriate moment, after a satisfactory agreement has been reached, all States, particularly the nuclear Powers, will lend their full co-operation for the effective realization of the peaceful aims inspiring the present resolution;

4. *Requests* the Secretary-General to extend to the States of Latin America, at their request, such technical facilities as they may require in order to achieve the aims set forth in the present resolution.

1265th plenary meeting,
27 November 1963.

The following year the Latin American nations undertook a process of negotiations that would last almost three years. The Mexican Under-Secretary for Foreign Affairs, Alfonso García Robles, presided over the entire negotiating process that began with the Mexico City Conference (November 23-27, 1964) which established the Preparatory Commission for the Denuclearization of Latin America with the mandate to draft a Treaty. The negotiations faced important hurdles such as defining the boundaries of the nuclear-weapon-free zone, transit guarantees, and safeguards on peaceful nuclear activities

On February 14, 1967, the Treaty was signed at a regional meeting of Latin American countries at Tlatelolco, a neighborhood of Mexico City. That fall the UN General Assembly endorsed the Treaty by a vote of 82 in favor, none against and 28 abstentions:[1]

United Nations General Assembly resolution 2286 (XXII)
Treaty for the Prohibition of Nuclear Weapons in Latin America

The General Assembly,

Recalling that in its resolution 1911 (XVIII)· of 27 November 1963 it expressed the hope that the States of Latin America would carry out studies and take appropriate measures to conclude a treaty that would prohibit nuclear weapons in Latin America,

Recalling also that in the same resolution it voiced its confidence that, once such a treaty was concluded, all States, and particularly the nuclear Powers, would lend it their full co-operation for the effective realization of its peaceful aims,

[1] Of the UN's then 122 Member States, 12 did not participate: Albania, Cambodia, Central African Republic, Congo (Brazzaville), Congo (Leopoldville), Gabon, Guinea, Laos, Malawi, Maldives, Rwanda and Sudan. The 28 abstentions were: Algeria, Botswana, Bulgaria, Burundi, Byelorussia, Cameroon, Cuba, Czechoslovakia, France, Ghana, Guyana, Hungary, Kenya, Lesotho, Liberia, Mali, Mauritania, Mongolia, Poland, Syria, Togo, Uganda, Ukraine, USSR, Tanzania, Upper Volta(now Burkina Faso), Yemen and Zambia.

Considering that in its resolution 2028 (XX) of 19 November 1965 it established the principle of an acceptable balance of mutual responsibilities and obligations of the nuclear and non-nuclear Powers,

Bearing in mind that in its resolution 2153 A (XXI) of 17 November 1966 it expressly called upon all nuclear-weapon Powers to refrain from -the use, or the threat of use, of nuclear weapons against States which might conclude regional treaties in order to ensure the total absence of nuclear weapons in their respective territories,

Noting that that is precisely the object of the Treaty for the Prohibition of Nuclear Weapons in Latin America, signed at Tlatelolco, Mexico, by twenty-one Latin American States, which are convinced that the Treaty will constitute a measure that will spare their peoples the squandering of their limited resources on nuclear armaments and will protect them against possible nuclear attacks on their territories, that it will be a stimulus to the peaceful use of nuclear energy in the promotion of economic and social development and that it will act as a significant contribution towards preventing the proliferation of nuclear weapons and as a powerful factor for general and complete disarmament,

Noting that it is the intent of the signatory States that all existing States within the zone defined in the Treaty may become parties to the Treaty without any restriction,

Taking note of the fact that the Treaty contains two additional protocols open, respectively, to the signature of States which, *de jure or de facto*, are internationally responsible for territories which lie within the limits of the geographical zone established in the Treaty and to the signature of States possessing nuclear weapons, and convinced that the co-operation of such States is necessary for the greater effectiveness of the Treaty,

1. *Welcomes with special satisfaction* the Treaty for the Prohibition of Nuclear Weapons in Latin America, which constitutes an event of historic significance in the efforts to prevent the proliferation of nuclear weapons and to promote international peace and security and which at the same time establishes the right of Latin American countries to use nuclear energy for demonstrated peaceful purposes in order to accelerate the economic and social development of their peoples;

2. *Calls upon* all States to give their full co-operation to ensure that the régime laid down in the Treaty enjoys the universal observance to which its lofty principles and noble aims entitle it;

3. *Recommends* States which are or may become signatories of the Treaty and those contemplated in Additional Protocol I of the Treaty to strive to take all the measures within their power to ensure that the Treaty speedily obtains the widest possible application among them;

4. *Invites* Powers possessing nuclear weapons to sign and ratify Additional Protocol II of the Treaty as soon possible.

1620th plenary meeting,
5 December 1967.

The Treaty is now in force for all 33 nations of Latin America and the Caribbean.

Additional Protocol I has been adhered to by all four extra-continental States with territories in the region: France, the Netherlands, the United Kingdom and the United States.

Additional Protocol II has been adhered to by China, France, Russia, the United Kingdom and the United States.

The United Nations played an important role in the consolidation of the Treaty of Tlatelolco. The Secretariat provided expertise during the negotiations and the General Assembly was instrumental in achieving adherence to the Treaty and its additional protocols. The UN General resolutions regarding the Treaty are listed in the following text of this compilation.

The Treaty of Tlatelolco served to advance the concept of nuclear-weapon-free zones within the United Nations. General Assembly resolution 3472 B (1975) defines a Nuclear-Weapon-Free Zone as "*any zone recognized as such by the General Assembly of the United Nations,*

which any group of States, in the free exercises of their sovereignty, has established by virtue of a treaty or convention whereby:

> *(a) The statute of total absence of nuclear weapons to which the zone shall be subject, including the procedure for the delimitation of the zone, is defined;*
> *(b) An international system of verification and control is established to guarantee compliance with the obligations deriving from that statute*."

The UN Disarmament Commission, in its report of April 30, 1999, recommended a set of principles and guidelines for the establishment of a nuclear-weapon-free zone, which included, *inter alia*:

- Nuclear-weapon-free zones should be established on the basis of arrangements freely arrived at among the States of the region concerned.
- The initiative to establish a nuclear-weapon-free zone should emanate exclusively from States within the region concerned and be pursued by all States of that region.
- The nuclear-weapon States should be consulted during the negotiations of each treaty and its relevant protocol(s) establishing a nuclear-weapon-free zone in order to facilitate their signature to and ratification of the relevant protocol(s) to the treaty, through which they undertake legally binding commitments to the status of the zone and not to use or threaten to use nuclear weapons against States parties to the treaty.
- A nuclear-weapon-free zone should not prevent the use of nuclear science and technology for peaceful purposes and could also promote, if provided for in the treaties establishing such zones, bilateral, regional and international cooperation for the peaceful use of nuclear energy in the zone, in support of socio-economic, scientific and technological development of the States parties.

List of United Nations General Assembly resolutions on the Treaty of Tlatelolco

All resolutions were adopted upon a recommendation of the UN General Assembly's First Committee.
● Indicates the agenda item was the same as the preceding one.

	Number	Date	Vote	Agenda item
1.	1911 (XVIII)	27 Nov 1963	91-0-15	DENUCLEARIZATION OF LATIN AMERICA
2.	2286 (XXII)	5 Dec 1967	82-0-28	TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA
3.	2456 B (XXIII)	20 Dec 1968	98-0-16	CONFERENCE OF NON-NUCLEAR-WEAPON STATES [IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2286 (XXII) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)]
4.	2666 (XXV)	7 Dec 1970	104-0-12	STATUS OF THE IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2456 B (XXIII) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
5.	2830 (XXVI)	16 Dec 1971	101-0-12	STATUS OF THE IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2666 (XXV) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
6.	2935 (XXVII)	29 Nov 1972	101-0-17	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2830 (XXVI) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
7.	3079 (XXVIII)	6 Dec 1973	116-0-12	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2935 (XXVII) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
8.	3258 (XXIX)	9 Dec 1974	114-0-15	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 3079 (XXVIIII) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
9.	3262 (XXIX)	9 Dec 1974	115-0-17	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 2286 (XXII) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
10.	3467 (XXX)	11 Dec 1975	115-0-12	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 3258 (XXIX) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
11.	3473 (XXX)	11 Dec 1975	113-0-16	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 3262 (XXIX) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
12.	31/67	10 Dec 1976	119-0-14	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 3473 (XXX) CONCERNING THE SIGNATURE AND

				RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
13.	32/76	12 Dec 1977	113-0-14	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 3473 (XXX) CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
14.	32/79	12 Dec 1977	118-0-13	IMPLEMENTATION OF A GENERAL ASSEMBLY RESOLUTION 31/67 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
15.	33/58	14 Dec 1978	WV	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 32/76 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
16.	33/61	14 Dec 1978	WV	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 32/79 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
17.	34/71	11 Dec 1979	WV	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 33/58 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
18.	34/74	11 Dec 1979	WV	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 33/61 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL II OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
19.	35/143	12 Dec 1980	138-0-5	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 34/71 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
20.	36/83	9 Dec 1981	138-0-5	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 35/143 CONCERNING THE SIGNATURE AND RATIFICATIONOF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
21.	37/71	9 Dec 1982	136-0-7	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 36/83 CONCERNING THESIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
22.	38/61	15 Dec 1983	135-0-9	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 37/71 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
23.	39/51	12 Dec 1984	139-0-8	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 38/61 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
24.	40/79	12 Dec 1985	139-0-7	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 39/51 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA

				(TREATY OF TLATELOLCO)
25.	41/45	3 Dec 1986	145-0-7	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 40/79 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
26.	42/25	30 Nov 1987	147-0-7	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 41/45 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
27.	43/62	7 Dec 1988	149-0-5	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 42/25 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
28.	44/104	15 Dec 1989	147-0-3	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 43/62 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA (TREATY OF TLATELOLCO)
29.	45/48	4 Dec 1990	141-0-3	IMPLEMENTATION OF GENERAL ASSEMBLY RESOLUTION 44/104 CONCERNING THE SIGNATURE AND RATIFICATION OF ADDITIONAL PROTOCOL I OF THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA AND THE CARIBBEAN (TREATY OF TLATELOLCO)
30.	47/61	9 Dec 1992	WV	CONSOLIDATION OF THE REGIME ESTABLISHED BY THE TREATY FOR THE PROHIBITION OF NUCLEAR WEAPONS IN LATIN AMERICA AND THE CARIBBEAN (TREATY OF TLATELOLCO)
31.	48/85	16 Dec 1993	WV	•
32.	49/83	15 Dec 1994	WV	•
33.	50/77	12 Dec 1995	WV	•
34.	51/52	10 Dec 1996	WV	•
35.	52/45	9 Dec 1997	WV	•
36.	53/83	4 Dec 1998	WV	•
37.	54/60	1 Dec 1999	WV	•
38.	55/39	20 Nov 2000	WV	•
39.	56/30	29 Nov 2001	WV	•
40.	58/31	8 Dec 2003	WV	•
41.	60/50	8 Dec 2005	WV	•
42.	62/16	5 Dec 2007	WV	•
43.	65/40	8 Dec 2010	WV	•

GIVING UP NUCLEAR WEAPONS: LESSONS LEARNED FROM THE PAST

José Goldemberg[1]

In the mid-1960s, the United States, the Soviet Union, the United Kingdom, France, and China were the only countries to possess nuclear weapons. In 2005, at least India, Pakistan, and Israel should be added to that list. Several other countries have flirted with such weapons: Sweden, South Africa, Brazil, Argentina, Libya, Taiwan, Iran, Iraq, South Korea, and North Korea. This list indicates that President Kennedy´s nightmarish vision of a world with "fifteen, twenty, or twenty-five nuclear powers" was not very far off. In almost all of these countries the bureaucratic self-aggrandizement of the nuclear establishment has played an important role.

By the end of the 1960s, widespread testing of nuclear weapons in the atmosphere by the US and the Soviet Union sparked serious concern about radioactive fallout and led to the banning of such tests. At the same time, the increased destructive power of nuclear weapons convinced the two great nuclear powers that a proliferation of nuclear states was totally undesirable and should be prevented. Together they succeeded in approving the Nonproliferation Treaty (NPT) in 1968.

Immediately after the NPT entered into force in 1970, an array of instruments was put in place to avoid proliferation efforts, including the activities of the International Atomic Energy Agency (IAEA), the Nuclear Suppliers Group (NSG), and even sanctions. They did work to some extent but did not deter India from exploding a nuclear device in 1974 and Pakistan in 1998, not to mention that Israel has had such weapons for a long time. In the same vein, despite all existing restrictions on the movement of nuclear materials that could lead to weapons, Iraq had an advanced nuclear program, which was dismantled after 1991.

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[1] Professor, University of São Paulo and Secretary for the Environment State of São Paulo, Brazil. He delivered the keynote address from which this editorial is derived to the Sandia National Laboratories Fourteenth International Security Conference *Strengthening the Nuclear Nonproliferation Regime: Focus on the Civilian Nuclear Fuel Cycle*. The conference was held April 4-6, 2005, in Chantilly, Virginia. The full address is available online at: <http://www.intlsecconf.sandia.gov/goldembert_05-isc.pdf>.

José Goldemberg has played a central role in moving Brazil toward full compliance with the nonproliferation regime and has been a strong advocate for continuing commitment. Dr. Goldemberg currently holds the position of Secretary for the Environment for the State of São Paulo. He has also served as president of the Energy Company of the State of São Paulo, Secretary of Science and Technology for Brazil, Minister of Education for Brazil, and Acting Secretary for the Environment for Brazil. Dr. Goldemberg has served as President of the Brazilian Association for the Advancement of Science, on the advisory board of the Alliance for Global Sustainability, on the environmental advisory board of Asea Brown Boveri (ABB), as chairman of the World Energy Assessment, and as chairman of the board of the International Energy Initiative. Dr. Goldemberg's memberships have also included the World Commission on Dams, the Brazilian Academy of Sciences, the Third World Academy of Science, and the National Council for Energy Policy of Brazil.

José Goldemberg earned his PhD from the University of São Paulo (Brazil) after receiving a Bachelor of Science at the same university and completing graduate work in physics at the University of Saskatchewan (Canada) and the University of Illinois. Dr. Goldemberg, the author of many technical articles and books about nuclear physics, the environment, and energy, has served as rector of the university and director of the Institute of Physics in addition to his current position of full professor of physics at the University of São Paulo. Dr. Goldemberg has held a professorship and/or served as a research associate at the University of Paris (Orsay), the University of Toronto (Canada), Princeton University, the International Academy of the Environment (Geneva, Switzerland), and Stanford University.

Honors received by Dr. Goldemberg include DSc "Honoris Causa" by Technion (Israel Institute of Technology), corecipient of the Mitchell Prize for Sustainable Development (US), establishment of the José Goldemberg Chair in Atmospheric Physics at Tel Aviv University (Israel), and corecipient of the VOLVO Environment Prize 2000.

The rationale behind the refusal of Argentina and Brazil to join the NPT was to keep the nuclear option open. It is therefore not surprising that Brazil and Argentina initially followed a path similar to those of India and Pakistan and others that started with nuclear reactors for power production. In Brazil, Westinghouse installed the Angra I reactor in 1968. In the mid-1970s a huge West Germany-Brazil nuclear deal was signed, which was supposed to lead Brazil in 20 years to complete nuclear independence, including reprocessing and enrichment. This deal crumbled under US pressure and its own weaknesses. Brazil has abundant hydroelectric resources, so the deal never made much sense from an economic viewpoint.

When the US under the Carter Administration canceled the supply of enriched uranium to the Angra I reactor, the Brazilian military started three uncoordinated parallel programs in the Navy, the Air Force, and the Army. Such programs were viewed with great suspicion by the United States, and it probably didn't pass unnoticed by the Carter administration that the military government in power at the time had ambitions for development of weapons. For that reason, access to some modern technologies was made unavailable to Brazil, and Brazil was placed on a surveillance list of countries suspected of conducting secret programs for the production of nuclear weapons.

By 1990, the political situations in Argentina and Brazil changed dramatically, with the end of military regimes and the election of civilian presidents. The return of democratic rule to Brazil and Argentina, by itself, changed the priorities of governments that were hard pressed by economic concerns and social pressures. The response was to abandon expensive prestige-seeking programs such as the nuclear one. Argentina and Brazil quickly negotiated an agreement, very similar to the EURATOM system, whereby the two countries established their own agency for the control of nuclear materials, which signed agreements with the IAEA. Shortly afterward, both countries joined the NPT.

What one can learn from these experiences in avoiding a nuclear path is that only the removal of the reasons why states proliferate is effective. For example, when it became clear that South Africa was not going to suffer a total onslaught of black Africans, its nuclear weapons program was abandoned. Sweden had concluded a long time before that there was no pressing reason to go that way. Brazil and Argentina realized that their dreams of grandeur, of becoming great powers served more civilian and military special interest groups than the interests of the nations.

Denuclearization is a difficult goal to achieve but the above examples show that it can be achieved by removing the causes that drive nations to become nuclear states.

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The Treaty of Tlatelolco + 40[1]

Miguel Marín Bosch

I

Weapons of mass destruction ─biological, chemical and nuclear─ were developed during the first half of the twentieth century. In the second half of that century the international community undertook efforts aimed at abolishing those weapons. The verb "abolish" is appropriate, as was confirmed by the authors of the text we referred to in our previous article on the urgent need to eliminate them.

The international community has had considerable success in its struggle against weapons of mass destruction. In 1972 it concluded the convention on the elimination of biological weapons and in 1993 it opened for signature the treaty on chemical weapons. Pending is the convention on the elimination of nuclear weapons.

The nuclear challenge has been complicated by the emergence of new nuclear-weapon States and the possibility that non-State actors obtain the fissile material needed to build a bomb. From the beginning of the nuclear age ways were sought to prevent the proliferation of those weapons to more and more countries. The peaceful uses of nuclear energy were also emphasized.

Over time the conclusion was reached that the only way to avoid the proliferation of nuclear weapons was through an international verification system for the use of nuclear energy exclusively for peaceful purposes. That was the origin of the International Atomic Energy Agency (IAEA): A way also had to be found to commit those States that already had nuclear arsenals to give them up.

In other words, the elements began to appear for a multilateral contract. The vast majority of nations would undertake not to play the nuclear card in exchange for two things: first, that nuclear countries eliminate their own arsenals and, second, that technology and materials be made available for the peaceful uses of nuclear energy. That was the contract concluded in 1968 in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). It was thought then that the NPT, described as the cornerstone of the non-proliferation regime, would pave the way towards a nuclear-weapon-free world free.

The NPT has 189 States Party, that is, all of the world's nations except for India, Israel and Pakistan. The 184 countries without nuclear weapons are committed not to acquire them and the five that do have them are obligated to eliminate them. These are China, France, Russia, the United Kingdom and the United States.

At he same time, several of the world's regions have become nuclear-weapon-free zones. Mexico, which participated actively in the negotiation of the NPT, led the way for the establishment of such zones. Alfonso García Robles was the architect of the Treaty of Tlatelolco which turned Latin America and the Caribbean into the first nuclear-weapon-free zone in a densely populated region. Its immediate precedent was the 1959 treaty that completely demilitarized Antarctica. But its permanent inhabitants are seals, sea lions, penguins and other birds, fish and mammals.

All Latin American and Caribbean nations have ratified the Treaty of Tlatelolco. The Treaty has two additional protocols. The four countries (France, the Netherlands, the United King-

[1] These two articles were published in Spanish in *La Jornada* on 1 and 15 February 2007, respectively.

dom and the United States) that *de jure* o *de facto* have possessions in the zone have committed themselves, in the Treaty's Protocol I, to apply the regime of nuclear demilitarization to those territories. Five of the eight nuclear-weapon States have committed themselves, in Protocol II, not to use or threaten to use nuclear weapons against the countries of the region. They are China, France, Russia, the United Kingdom and the United States.

The Treaty of Tlatelolco was open for signature forty years ago, on 14 February 1967. In 1982 García Robles was awarded the Nobel Peace Prize, which he shared with a distinguished Swede, Alva Myrdal.

There is a curious twist to the story of the origins of the Treaty of Tlatelolco. In mid-1962, months before the missile crisis in Cuba, the Brazilian Government decided to submit to the United Nations a proposal to turn Latin America into a nuclear-weapons-free zone. It was not successful. Brazil then opted for a series of letters to be signed by the presidents of Bolivia, Brazil, Chile and Ecuador. Mexico would join them later. In 1963 consultations were undertaken to prepare for the negotiations of the future treaty. However, on 1 April 1964 a military coup deposed the democratic government in Brazil and the new leaders abandoned the project. Mexico would take it on. Had it not been for that coup d'état the treaty would perhaps be known as the treaty of Itamaraty.

The example set by Latin America and the Caribbean was followed by the South Pacific (Treaty of Rarotonga which entered into force in 1986), Southeast Asia (Bangkok, 1997) and Africa, whose Treaty of Pelindaba has yet to enter into force. If one adds the zones of application of those four treaties, it turns out that the Southern Hemisphere is a nuclear-weapon-free zone. Or, rather, *almost* free since vessels of the nuclear Powers carrying nuclear weapons or are powered by nuclear energy travel all over the oceans. That is one problem that has not been resolved. The great Powers insist on the freedom of the seas. Are they right?

Another question regarding nuclear-weapon-free zones also merits our attention and we shall refer to it in our next article: the relationship of the so-called new nuclear Powers (India, Israel and Pakistan) to those zones.

II

The Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean, known as the Treaty of Tlatelolco, turned forty yesterday. A two-day meeting to commemorate the anniversary ends today in the Mexican Foreign Office. As we noted in our previous article, the example set by our region has been an inspiration for others: the South Pacific, Southeast Asia, Africa and Central Asia. To promote greater cooperation among those zones, in 2005 the first conference of countries from those regions was held in Mexico City. Also invited was Mongolia, a country that proclaimed itself a nuclear-weapon-free zone.

When a region (or a country) constitutes itself into a nuclear-weapon-free zone, it needs the cooperation of the international community in general and the nuclear-weapon States in particular. In the case of Latin America and the Caribbean, as in other regions, it was also necessary to obtain the support of those States which *de jure* o *de facto* have territories in the zone. Thus we have Protocol I of the Treaty of Tlatelolco, in which France, the Netherlands, the United Kingdom and the United States committed themselves to apply to their territories in the zone the statute of military denuclearization

In the Treaty's Protocol II the nuclear-weapon States are committed to respect the region's status as a nuclear-weapon-free zone and, more importantly, not to use or threaten to use nuclear weapons against the Treaty's Contracting Parties.

From the outset of the negotiations of the Treaty of Tlatelolco, Mexico decided to involve the United Nations in the process. Members of the UN Secretariat helped to ensure the success of the efforts led by Alfonso García Robles. The Canadian William Epstein made a remarkable contribution. The decisive support of the UN General Assembly was also indispensable. Other regions followed this example and turned to the UN's experience in this field and the General Assembly to seek the full implementation of the treaties and their protocols.

At the last annual meeting of the General Assembly the members of the Central Asia nuclear-weapon-free zone (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan) encountered certain resistance from France, the United Kingdom and the United States. They had some doubts regarding the possible transit of nuclear weapons through the zone's territory. In particular, they felt that some of the articles of the Treaty of Semipalatinsk allow each State party to decide on the transit (by air, sea or land) of nuclear weapons. They were thinking of Russian nuclear weapons.

The question of the transit of nuclear weapons through the Latin American and Caribbean zone was one of the most complicated issues faced by the negotiators of the Treaty of Tlatelolco. The solution found satisfied no one. Given the demands of France, the United Kingdom and the United States to allow the freedom of transit of their nuclear-armed aircraft and navy vessels, the negotiators opted to ignore the question in the Treaty's text. However, in the negotiations it was accepted that each country would have the right to authorize or not that transit. Curiously enough, the Soviet Union argued then that the authorization of any form of transit would run counter to the spirit of the Treaty. Today, Russia has a different opinion when it comes to the Treaty of Semipalatinsk.

In all of the other treaties establishing nuclear-weapon-free zones it is explicitly recognized that each country has the right to authorize or deny the freedom of transit. The Treaty of Tlatelolco also differs from other agreements in to other aspects. On the one hand, it is the only one that established a permanent agency (the OPANAL) whereas the other treaties rely on periodic consultations. On the other, the Treaty of Tlatelolco does not identify those nuclear-weapon States that may adhere to its Protocol II. It is the only one not do so. The other regional instruments list five: China, France, Russia, the United Kingdom and the United States. Why are not India, Israel and Pakistan mentioned?

The reason for this is a clause in the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) which was open for signature in 1968. It states that, for the purposes of this Treaty, a nuclear-weapon State is one which has manufactured and exploded a nuclear weapon or other nuclear explosive device prior to 1 January 1967. That is why the five insist that they are "legitimate" nuclear-weapon States since the NPT recognizes them as such. But, what about the other three nuclear Powers?

Until recently, when the new U.S. Secretary of Defense referred to Israel as a nuclear-weapon State, Tel Aviv had never confirmed it (despite the revelations of Mordecai Vanunu). Until recently, the so-called legal nuclear Powers had refused to accept India and Pakistan as their equals. President George W. Bush changed that policy, at least insofar as India is concerned, when he signed cooperation agreements between Washington and New Delhi in the nuclear

field which will undoubtedly translate into large contracts. President Jacques Chirac soon followed Bush's example with India.

Protocol II of the Treaty of Tlatelolco does not specify which nations may sign it. It would therefore be useful to have the opinion of the Contracting Parties on the possibility that India, Israel and Pakistan adhere to that instrument to guarantee the Latin American and Caribbean States that they will not use or threaten to use nuclear weapons against them.

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