

The Consolidation of the Nuclear Age

MICHAEL D. GORDIN

On August 6 and 9, 1945, the 503rd Composite Group of the Army Air Forces dropped a single bomb on each of two Japanese cities, Hiroshima and Nagasaki. The cities were devastated, with tens of thousands killed in the blast, the subsequent firestorm, and the days of starvation and chaos that followed, not to mention the many more who suffered from lingering effects in the years to come. As is universally known today – but was not always understood then – these were atomic (more precisely, nuclear or fission) bombs, which generated their tremendous power from the splitting of the heavy atomic nuclei of uranium (Hiroshima’s Little Boy) or plutonium (Nagasaki’s Fat Man). They have never been used in combat since, yet from this first catastrophic revelation to global humanity they have been integral to the relationship of the United States with the world.

Once the Japanese surrender was signed aboard the *USS Missouri* in Tokyo Bay on September 2, World War II was at last over and the world entered a period known open-endedly as “postwar”; it was not, however, evident that the epoch had also become what has since been termed “the nuclear age.” Nuclear weapons have been a touchstone of domestic and international politics and culture for the past three-quarters of a century; they became so largely as a result of the processes that unfolded during the first quarter-century of the postwar. Contingently, but nonetheless quite thoroughly, politicians, military officials, public intellectuals, and citizens of various countries in the world made choices to treat these devices as a category apart. The absence of any further use of these weapons in warfare (and yet their massive stockpiling alongside the increasing destructiveness of what came to be called “conventional weapons”) and the absence of major war on the European continent (yet its efflorescence in proxy wars and decolonization conflicts around the globe) have led to a vigorous debate among political scientists about whether the

combination of fission and especially fusion (hydrogen or thermonuclear) arms with intercontinental ballistic missiles have produced a “nuclear revolution” in the global order. This unresolved debate shapes, often implicitly, much of the historiography.

Just about every history of nuclear weapons puts the United States in the heart of the picture, and at the same time most histories have framed their accounts in terms of nation-states (which developed their weapons in the shadow of American disapproval and active discouragement). The centrality of the United States to nuclear history is seemingly inescapable: beyond the destruction of Hiroshima and Nagasaki, the Americans developed the first nuclear reactor (1942), conducted the first nuclear test (July 16, 1945), and exploded the first hydrogen bomb (1952). The world was second. The account here starts from different premises: no single country has ever developed a nuclear weapon autarkically; each has borrowed resources and information from other parts of the world. This was no less true for the United States: the uranium used to make the first nuclear weapons came from the Belgian Congo and Canada, and the wartime project was staffed with scientists from Great Britain, Canada, France, Italy, Denmark, Germany, Hungary, Austria, and more. Nuclear weapons did not just mediate and enable the dominant position the United States took in the world – they were themselves constituted by that transnational relationship.

This chapter traces the history of America’s nuclear weapons and the world from first use in 1945 to the going-into-force of the Non-Proliferation Treaty in 1970 along three overlapping axes. Each of these reorients the story by emphasizing the United States not as setting the agenda but instead *reactive* in the nuclear realm. All three center on the question of knowledge and its control, showing the embedding of domestic, international, and transnational processes primarily from the perspective of a fragmented and disoriented US national security state. The first axis follows nuclear intelligence, as the Americans confronted the period of atomic monopoly (1945–1949) with an anxiety about what other nations knew about the bomb, and what the United States might itself learn about that knowledge. The second traces the burgeoning arms race, in which various segments of the state attempted to solidify knowledge and control over the American nuclear arsenal. The final axis traces how a postwar discourse on “disarmament” had turned by the late 1960s into one about “proliferation,” thus marginalizing an emergent concern about the health and environmental effects of nuclear weapons and institutionalizing a world order based on exclusion.

Nuclear Intelligence

A small subset of soldiers, politicians, and scientists learned definitively that humans could release the power of the atom as a weapon of war on July 16, 1945, at the Trinity test; the rest of the world learned this on August 6 at Hiroshima. It was now impossible to unknow. Keeping in mind the rapid arms race in chemical munitions that followed the introduction of weaponized chlorine gas by German forces at Ypres, Belgium, in spring 1915, American policymakers and journalists began to fret about the United States itself becoming victim to an attack like the one unleashed on Japan. Within days of Hiroshima, American newspapers speculated about the carnage should American cities be subject to nuclear bombing – this at a time when the only such device on earth's surface was an unassembled Fat Man in the possession of the US military.

That such a bomb was feasible was no longer an open question. General Leslie Groves, the commanding officer of the Manhattan Project, had imposed intense secrecy on all aspects of the program. This secrecy was so profound that even Vice President Harry Truman only learned of the existence of the project over a week after he ascended to the presidency upon the death of Franklin D. Roosevelt. After Hiroshima, Groves and the War Department constricted the flow of information about this most newsworthy of topics to a trickle. Truman's press release announcing the bombing of Hiroshima was scripted and vetted, as were the newspaper articles written by William Leonard Laurence, the *New York Times* science journalist embedded in the project. Groves authorized an official history of the project, compiled during the war by Princeton physicist Henry DeWolf Smyth, *Atomic Energy for Military Purposes*, in mid-August 1945. The "Smyth Report" and Laurence's articles subsequently became handbooks for declassification. What was in those texts was suitable for release by the media; what was not, was not. The Atomic Energy Act of 1946, sponsored by Senator Brien McMahon (Democrat, Connecticut), codified many of Groves's practices of official secrecy. Atomic knowledge was "born secret" and subject to routine declassification review before release. Reactors, physics laboratories, and other facilities were placed under a newly erected security-clearance regime. These radical practices of secrecy comprise one of the defining characteristics of the nuclear age. This is true for every state that has ever embarked on developing a weapon.

That intrinsic secrecy posed a problem to the intelligence community from the beginning of World War II. Albert Einstein's 1939 letter to Roosevelt that nominally jumpstarted the program indicated that the Germans had the

technical knowledge – and access to Czechoslovak uranium – to produce such a device. Both the British and Americans attempted to determine whether they were actually doing so. The former, looking at publicly available lecture catalogs and physics journals, concluded that most German physicists were still at their posts and nothing like the kind of mobilization needed to develop nuclear weapons was underway. Groves, not trusting such estimates, sent Dutch émigré physicist Samuel Goudsmit and a military team into liberated Europe to confiscate documents and eventually scientists from Italy, France, and Germany. Ten German scientists were interned in early July 1945 at Farm Hall in Godmanchester, England, where they were bugged as they discussed the shocking news from Hiroshima. The transcripts of those conversations, released in the 1990s, prove an essential source for any discussion of the Nazi uranium program, which stalled relatively early. The British had been right about the past, while the Americans pondered the kind of investment needed to keep track of other countries' atomic ambitions in the future.

That assessment was reinforced by the discovery of the extent of Soviet espionage efforts (codenamed “Enormoz”) reaching to the very heart of the Manhattan Project. Their success and subsequent geopolitical importance have drawn significant historical scrutiny, but such scrutiny risks exaggerating the foresight of Soviet intelligence officers. The fact is that massive probes were directed at almost every aspect of the Allied political and military establishment. The deep secrecy of the Manhattan Project attracted significant attention, but not necessarily more than radar, tank production, economic espionage, or the more obvious pilfering of diplomatic correspondence. General Groves was aware that Soviet spies were attempting to leech away details of the bomb program, but his countermeasures failed to prevent significant penetration. The issue came to a head in February 1946, when Igor Gouzenko, a Soviet cipher clerk at the embassy in Ottawa, defected with a cache of cables detailing classified information from the Canadian segment of the Manhattan Project. This led to the arrest of Alan Nunn May, a British physicist seconded during the war to the Chalk River nuclear reactor in Ontario.

Chalk River was a long way from Los Alamos, New Mexico, the bomb-design facility at the heart of the Manhattan Project, which had also been compromised. Intercepted coded cables back to Moscow – dubbed the “Venona” documents – began to be cracked in 1947 by Meredith Gardner, a linguist working for Army Signals Intelligence, taking advantage of sloppy Soviet spycraft that reproduced pages in otherwise-unbreakable one-time

pads. Sifting through the Venona codenames revealed a series of important leaks, including German refugee physicist Klaus Fuchs (a.k.a. “Charles” or “Rest”), who had been on the British delegation to Los Alamos; Fuchs was convicted in 1950 in Britain. The publicity surrounding Soviet spying raised anxieties in the United States about compromised physicists – alleged to be communists or fellow travelers who would betray the United States by smuggling out “the secret of the bomb” in the soles of their shoes – who were subjected to ever higher degrees of scrutiny, including firings, blacklists, and revoked passports. No one was immune from these developments. The wartime director of Los Alamos, J. Robert Oppenheimer (subsequently director of the Institute for Advanced Study in Princeton) was stripped of his security clearance in May 1954 when his past associations with left-wing groups, long known to the military and dismissed during the war, were prosecuted anew by political enemies.

The most salient resonance of atomic espionage stemmed directly from Fuchs’s arrest. Due to another slip in Soviet spy-running techniques, Fuchs’s courier Harry Gold had also handled the transfer of information from a GI named David Greenglass who had been stationed first at the Oak Ridge uranium-enrichment facility in Tennessee and then was transferred to Los Alamos. Greenglass had been a member of the Young Communist League before enlisting in the Army and was recruited as a spy by his brother-in-law, Julius Rosenberg. The arrest of Fuchs led to Greenglass, and Greenglass implicated Rosenberg and his wife, David’s sister Ethel. Julius was charged in July 1950 and Ethel a month later of violating Woodrow Wilson’s Espionage Act of 1917. (This law is still on the books; Edward Snowden has been charged under it.) After a highly publicized trial in the climate of the Red Scare – and more than a veneer of anti-Semitism – Julius and Ethel Rosenberg were executed on June 19, 1953, by electrocution. They remain the only married couple to be executed for federal crimes in the United States, and the only civilian spies ever executed for conspiracy to commit espionage and treason. (Materials released from post-Soviet archives generally corroborate Julius’s guilt, though evidence does not implicate Ethel.) Though the conviction and punishment were popular within the United States, internationally the climate of hysteria and railroaded procedures tarnished America’s international image.

All this focus on espionage – the transnational flow of information – highlighted the chaotic state of intelligence-gathering by the US government. Information seemed to be flowing outward, but was it flowing back in? Entering World War II, the United States had no standing intelligence agency, it being the firm belief of the establishment that such institutions in

peacetime were antidemocratic and characteristic of Old World monarchies. For the war, President Roosevelt created the Office of Strategic Services (OSS) under William (“Wild Bill”) Donovan, which was coached and extensively shaped by British security services – which in turn endowed the organization with its own complement of undercover Soviet agents. Truman, long suspicious of the OSS in general and Donovan in particular, abolished it on September 20, 1945. Nonetheless, it became evident even to him that some kind of centralized intelligence bureau was required for this postwar/Cold War world, and his administration prioritized intelligence in their promulgation of the National Security Act of September 18, 1947. In addition to merging the Departments of War (renamed Army) and Navy into the National Military Establishment – the name “Department of Defense” would come only in August 1949 – it established the Air Force, the National Security Council, and the Central Intelligence Agency (CIA). As important as these reforms were, that left almost two years to the day without a clearing-house for foreign intelligence. Of course, just because there was no CIA did not mean that various arms of the government had neglected the importance of learning about foreign (read: Soviet) nuclear activities. Multiple agencies ventured into this area during the window between the end of the OSS and the fully functional CIA: the Strategic Air Command, the Joint Chiefs of Staff, Army Intelligence, Navy Intelligence, the State Department, and Air Force Intelligence. The leading edge of nuclear intelligence, though, came to reside in the Atomic Energy Commission (AEC), created by McMahon’s Atomic Energy Act of 1946. This fundamental fragmentation in the national security state persisted for decades after reorganization.

The AEC took over from the demobilized Manhattan Engineering District on January 1, 1947 and consisted of five commissioners whose head was a member of the cabinet. The first chairman, David E. Lilienthal, had served as director of the Tennessee Valley Authority in the 1930s and was a visible emblem of continuity from New Deal antecedents. The AEC was in charge of weapons production, the promotion of nuclear power (not yet in existence but eagerly anticipated), and scientific research related to the atomic nucleus (including radioisotopes used in biological assays). Intelligence would likely have fallen to a low priority if not for intense lobbying by Commissioner Lewis Strauss, a Hoover Republican who was obsessed with the question of when the Soviets would develop the atomic bomb. Prevailing estimates in both the press and classified documents ranged wildly. The dominant guess was five to ten years, and this is what

Truman and Lilienthal were repeatedly told; that five-year window would be promulgated anew every year from 1945 onward.

Under Strauss's prodding, scientists both inside and outside the military explored a number of different methods for detecting nuclear blasts at a distance, drawn from past experiences with residues from the Trinity test, Hiroshima and Nagasaki, and the two postwar nuclear test series (Crossroads in 1946 and Sandstone in 1948), as well as theoretical proposals: seismic measures, analyzing rainwater for radioactive isotopes, looking for disruptions in earth's electromagnetic field, changes in the illumination of the sky, reflection off the face of the moon, dimpling of the ionosphere, spikes in gamma-ray fluxes, acoustic detection, and shockwaves transmitted through the earth to the opposite side of the globe. Notably missing from this list was human intelligence, as the United States and its allies proved singularly unsuccessful in the immediate postwar years in infiltrating any agents into the Soviet Union. Technology would have to serve where people could not. Eventually, a program of airborne radiological detection named AFOAT-1 was established under the weather service of the Air Force. Beginning in April 1949, charcoal filters were bolted to the outside of weather planes that flew from Alaska up and down the Soviet Pacific coast multiple times a day, and then chemically analyzed by a laboratory in Berkeley whenever a Geiger counter indicated some latent radioactivity. After 111 false alarms, the 112th alert on September 3, 1949, proved to have a mix of heavy isotopes characteristic of a nuclear explosion – though whether it was a true nuclear test or a reactor accident was unclear. After a complex vetting process which had to overcome Truman's and others' prior expectations of "five to ten years," the president announced on September 23 that Americans had detected a recent Soviet nuclear test. It would take two years before the Soviet Union conceded that it had a nuclear arsenal, which we now know began with a test on August 29, 1949, at Semipalatinsk in what is today northeastern Kazakhstan. Truman's statement sparked a media panic, capitalized on by advocates of ever-increasing secrecy and paranoia. The juxtaposition of the announcement with revelations about Soviet espionage proved essential for the campaign of the junior senator from Wisconsin, Joseph McCarthy, in his escalation of purging suspected communist subversion that had begun earlier under the House Un-American Activities Committee.

The Soviet test was the end of the US "atomic monopoly," but not, of course, the last instance of a state acquiring the capacity to produce nuclear explosives. The nuclear intelligence apparatus continued to monitor foreign nuclear tests. On October 3, 1952, the United Kingdom tested its first nuclear

device on the Montebello Islands off the western coast of Australia. This was no surprise because atomic cooperation between the two wartime allies had continued at a low level (though officially proscribed by the Atomic Energy Act of 1946 until its revision in 1954). France's first nuclear test, at Reggane in the Algerian Sahara on February 13, 1960, was more problematic politically, as the United States had tried repeatedly to dissuade French President Charles de Gaulle from acquiring his *force de frappe*. The most interesting case concerns the People's Republic of China (PRC). On October 16, 1964, the PRC detonated its first nuclear device – the fruit of intense domestic efforts combined with Soviet technical assistance preceding the Sino-Soviet split – at Lop Nur in the northwestern deserts. (Nuclear testing characteristically took place in colonial outposts or in incorporated regions that were subjugated by the political center.) By the time the Chinese test was being prepared, the United States had become so sophisticated with spy-plane overflights, signals intelligence, and other techniques that Secretary of State Dean Rusk announced the test on September 29, over two weeks in advance.

Bangs and Bucks

Nuclear intelligence of foreign powers took place against the backdrop of the US state coming to terms with its own arsenal: what was it, and what was it for? The answer to the first question might seem obvious: after all, the state had built the arsenal, so of course it would know its characteristics. It is difficult, however, to identify a single entity that can stand in for the state in nuclear matters. Nuclear intelligence was not the only aspect of atomic governance born fragmented.

The problem emerged with the Manhattan Project. The very secrecy attached to the program made achieving civilian control difficult. General Groves ran it with very minimal civilian oversight, and all decisions up to the point of selecting targets were largely at his discretion (with the important exception of Kyoto, which Secretary of War Henry Stimson removed from the list). When the war ended, Groves halted manufacture of nuclear weapons – both the uranium facilities at Oak Ridge, Tennessee, and especially the plutonium plant at Hanford, Washington, were designed with mass production in mind – with a view to turning the project over to a civilian administration. That did not happen until January 1947 with the empaneling of the AEC, and so the quantity of nuclear weapons then available was small. By the time that Truman and Lilienthal thought to ask about the numbers in the middle of 1947, fewer than ten were available. Making more became

a priority, but a controversial one. Truman until the end of his presidency remained ambivalent about the weapons and reluctant to give the military complete jurisdiction over them.

Nominally, the AEC was in charge of all nuclear matters, making weapons and promoting and regulating reactors. The tension between these mandates was largely responsible for the fracturing of the organization in the 1970s into a Department of Energy (which still manufactures the bombs) and the Nuclear Regulatory Commission (to supervise the nuclear power industry). Despite the AEC's monopoly on weapons production, it had no authority to wage war and no delivery systems of its own. A baroque "custody dispute" broke out in the late 1940s over when bombs should be turned over to the various military branches, supplemented by regulatory concerns over uranium mining – who owns this very dangerous and valuable ore? – as the United States shifted from sources in the decolonizing world (South Africa, the Belgian Congo) to mines in the American West heavily worked by Native Americans. Truman kept the balance on the side of the AEC, but Eisenhower turned over more than 90 percent of assembled nuclear weapons to military control, in many cases "pre-delegating" authority to launch.

Within the Department of Defense there was further infighting. Early thinking about nuclear weapons understandably focused on airplanes as the obvious means for delivery. Officials within the Army Air Forces deftly used this argument to claim autonomy as a separate service branch, granted with the National Security Act of September 1947. Public discussion focused on the transformative potential of nuclear weapons for warfare treated the Air Force as the future and the Navy as well-nigh obsolete. Leaders of the latter branch demanded access to these weapons, and inter-service rivalry became so disruptive that within months of the end of the war the Joint Chiefs of Staff asserted its authority over military allocation of the weapons. To demonstrate this, the Joint Chiefs sponsored a nuclear test series in the South Pacific in June 1946, the first consisting of a test drop from a plane, the second of an underwater burst that produced an iconic mushroom cloud that was widely disseminated in popular culture. (The proposed third test was canceled.) International observers were invited, an assertion of American dominance and also a pacification of the Navy–Army Air Forces dispute. Meanwhile, without long-range missiles, delivery remained tied to either Navy or Air Force planes, with the B-29 the longest-range option (round-trip under 6,000 miles). Given distances to the Soviet Union, this necessitated overseas stationing of parts of the arsenal, enmeshing several nations in Europe and later Asia in the nuclear complex.



Figure 3.1 Vice Admiral William H. P. Blandy and his wife Roberta Blandy posed with Rear Admiral Frank J. Lowry at an event in 1946 commemorating the Bikini Atoll test that Vice Admiral Blandy oversaw. Source: Keystone-France / Gamma-Rapho / Getty Images.

Late 1949 brought two shocks to the Truman Administration – the establishment of the People’s Republic of China and the first Soviet nuclear test – confronting the president with two significant decisions related to the nuclear arsenal in the first half of 1950. On January 31, after a series of divisive conversations with Lilienthal, Secretary of Defense Louis Johnson, and Secretary of State Dean Acheson, Truman decided in favor of a crash program to develop a thermonuclear weapon, or the “Super” in the parlance of the times. The hydrogen bomb – which works through the fusion of light nuclei, the energy that powers stars – had been a speculative prospect at Los Alamos, worked on essentially alone by Hungarian émigré physicist Edward Teller. Figuring out how to initiate a fusion reaction within the confines of a deliverable bomb seemed initially impossible. If the problem could be cracked, it would pose serious challenges geopolitically. A hydrogen bomb could be scaled up to enormous destructive power with the potential to kill hundreds of thousands, if not millions, with a single bomb directed at a city.

Openly undertaking this effort could scuttle anemic disarmament efforts and trigger a “quantum leap” in the arms race. Given nuclear classification, Truman need not have made a public decision, but the debate was inadvertently leaked to the press by a senator (ironically in making a point about maintaining secrecy). The General Advisory Committee (GAC) of the AEC, composed of scientists and led by Oppenheimer, advised against a crash program, but anxiety about losing the edge in what had come to be interpreted as a nuclear race with the Soviets tipped Truman over the edge. Truman’s decision was final: concurrent with the fragmentation of nuclear oversight within the US government was the concentration of extraordinary, and unconstrained, power over nuclear decision-making in the person of the president, creating what one critic has termed a “thermonuclear monarchy.” The crash program reoriented resources toward exploring feasibility, and in short order Teller and mathematician Stanislaw Ulam conceived of a two-stage model which used radiation pressure from a fission bomb to trigger the thermonuclear reaction, detonating the Super with a “regular” nuclear bomb. The design concept converted many earlier opponents, including Oppenheimer, and the United States tested its first such bomb (Mike) on November 1, 1952, at Enewetak in the Pacific. The Soviets, using an independent design by physicist (and later dissident) Andrei Sakharov, tested theirs on August 12, 1953, announced four days in advance by Premier Georgii Malenkov. (Stalin had died five months earlier.)

These were very powerful weapons, and the only use initially contemplated for them was as city-destroyers, which had prompted the scientists’ opposition at the GAC. There was no clear sense at this point of how they might ever be integrated into thinkable military action. Truman’s second important decision of 1950 concerned matters of strategy which only incidentally related to nuclear weapons but would have significant repercussions for the massive arsenal buildup that would characterize the subsequent two administrations. In reaction to the Soviet test and the Chinese communists’ victory, Truman commissioned a thorough study of strategy, an effort led by Paul Nitze. Nitze adapted in an unambiguously militarized direction the ideas of Acheson aide and Russia hand George Kennan about the need to “contain” the Soviet Union. The plan, named NSC-68, demanded an increase in both conventional and nuclear armaments but deliberately left the price tags off so as not to spook the budget-conscious Truman. (Nitze later claimed he had given Acheson an estimate of “around forty billion dollars.”¹) NSC-68 was

¹ Luke Fletcher, “The Collapse of the Western World: Acheson, Nitze, and the NSC-68/ Rearmament Decision,” *Diplomatic History* 40, no. 4 (2016): 750–776, quotation on 768.

presented to Truman in April 1950 but was not immediately the basis of any dramatic changes in military posture or procurement. On June 25, 1950, North Korea invaded the South, launching the three-year Korean War, and by the end of that conflict much of the fiscal restraint had been cast to the winds. The 1952 defense budget represented a 458 percent increase over 1951 levels; manpower requirements more than doubled from 2.2 million to 5 million.² NSC-68 became a template for radical expansion of America's nuclear arsenal and also for the integration of those weapons into a more militarized posture that privileged a pessimistic view of Soviet intentions.

The escalation and the role of nuclear weapons within it need to be seen in an economic context as much as a political one. In late 1945, most US soldiers of World War II returned home, a massive and rapid demobilization. The shock to the economy of an influx of unemployed workers and the usual difficulties of reconversion to peacetime production brought an anticipated recession in their wake, compounding Truman's intrinsic aversion to profligate government spending. Even when the initial hardship was overcome, military planners recognized that these veterans would not take kindly to remobilization, even as relations quickly worsened with the Soviet Union, exemplified most dramatically in the Berlin blockade and airlift of 1948. The new postwar expense of maintaining global leadership backed by armed security guarantees to allies continued to eat at certain segments of the national security state, while others pushed for yet greater expenditures to a sector of the economy that did not typically yield significant multiplier effects in terms of growth. Nuclear weapons arrived on the scene at the moment that the White House and Pentagon were looking for a way to maintain security commitments without returning to a large standing army.

The economic pressures propelled a particular answer to the question: What was the United States supposed to do with its nuclear weapons? Within months of Hiroshima, an ascendant cohort of "nuclear strategists" such as Bernard Brodie – many of them former naval strategists reinventing themselves in the face of rhetoric that declared naval power obsolete – achieved a solid consensus that there could be no defense against a nuclear attack. Brodie argued that a bomber carrying the "absolute weapon" would always be able to breach air defenses; the only way to provide security from nuclear attack was to prevent the weapons from ever being used in the first place. Hence deterrence theory, long a staple of war-gaming, entered its atomic, supercharged, phase. New institutions such as the RAND Corporation

² Ken Young, "Revisiting NSC 68," *Journal of Cold War Studies* 15, no. 1 (Winter 2013): 3–33.

(financed by the Air Force) in Santa Monica, California, incorporated innovations in game theory and operations research into military planning in the 1950s to justify new tactics. With the advent of a Soviet nuclear arsenal, war planners argued in favor of more nuclear weapons to ensure the ability to respond to any Soviet aggression with a nuclear strike, thereby preventing it in the first place. Reliance on nuclear weapons as a deterrent was soon integrated into the postwar alliance structure, with the “nuclear umbrella” extended over Western Europe and East Asia. On October 30, 1953, President Dwight Eisenhower issued his “New Look” strategy – incidentally also the name of a wildly popular postwar Christian Dior fashion line. Secretary of State John Foster Dulles characterized the New Look as demanding “massive retaliation,” meaning nuclear escalation, to any enemy aggression. Eisenhower and Dulles thus shifted more resources into building the nuclear arsenal in the hope that it could substitute for expensive conventional buildups. Their worry, widely shared among the national security elite, was that the costs of decades of Cold War stalemate would bankrupt the United States. The nuclearization of geopolitics was reflected in the introduction of “Duck and Cover” drills in American schools and the normalization of nuclear fear.

In parallel, on December 8, 1953, Eisenhower gave a speech to the United Nations (UN) General Assembly proposing “Atoms for Peace,” a program that would encourage widespread use of the miracle of the atom for civilian purposes, principally electricity generation. A plan both to enroll developing nations under the American aegis and to provide cover for – and spiritually redeem – the overt aggression and militarism represented by nuclear warheads, Atoms for Peace initiated a global advertising campaign with a traveling exhibition to developing nations worldwide. The program eventually built reactors in Iran, Israel, and Pakistan, opening markets for American businesses and attempting to one-up the Soviet Union in addressing the energy needs of international development. (The safety and security concerns of civilian nuclear power began to tarnish the luster of the technology by the end of the 1970s.) Combined with the New Look, Atoms for Peace meant that both Eisenhower’s soft-power and hard-power foreign policies were highly nuclearized. The trend proved to be bipartisan. Even as John F. Kennedy’s Administration took over in 1961 with different domestic policies, the nuclearization of US posture was enhanced. In 1962 the Single Integrated Operational Plan promulgated a shift from “massive retaliation” to “flexible response” – meaning a sliding scale of military responses which ran the gamut from low-intensity conventional skirmishes up to nuclear

warning shots and culminating in global thermonuclear war. Although not all the options were nuclear, the need to maintain flexibility of nuclear munitions from the tactical to the strategic only enhanced the exponential growth of the nuclear arsenal. Armaments reached their global peak in the 1960s, spiking to 30,000 warheads during the Kennedy and Johnson Administrations, after which the numbers began a decline down to the present.

Despite assurances that more of these weapons would produce greater security, the moment of highest nuclearization was also the time when the world drifted as close to global conflagration as it has ever been. The story of the Cuban Missile Crisis can be, and often is, told as a rigidly Washington-centric narrative involving debates within the Executive Committee (ExComm) as hardliners and conciliators mooted invasions, blockades, and concessions. This narrative is easy to glean from such popular accounts as Robert Kennedy's *Thirteen Days* and the 2000 movie (dir. Roger Donaldson) of the same name. But if any aspect of the nuclear age should be seen as demonstrating how the agency of other countries put the United States in a reactive posture, this was it. In May 1960, an American U-2 spy plane was shot down while on a reconnaissance mission over the Soviet Union, ending a stretch of improved relations, especially on atomic matters. After the 1961 Bay of Pigs fiasco failed to unseat the communist regime in Cuba, Fidel Castro and his Soviet allies had reason to interpret the botched invasion as another installment in a long series of American interventions in the Caribbean. Nikita Khrushchev acceded to requests to station nuclear missiles in Cuba; these, in turn, were detected by U-2 overflights in October 1962. The confrontation had global resonances, not least in Latin America, and the resolution – a blockade which led to Khrushchev removing the missiles from Cuba – did little to moderate suspicion of the United States in the region. Missing from the public discussion was what the Soviets got: the removal of American nuclear missiles from Turkey, a North Atlantic Treaty Organization (NATO) ally on the Soviet border. By this point, and in sharp contrast to the days of Truman and Lilienthal, detailed knowledge within the national security state of how many missiles the United States had and where they were stationed enabled a compromise that promoted further cooperation between the superpowers on nuclear matters.

The Hegemony of Proliferation

While the military was pushing for more nuclear weapons, groups both within the national security state and in civil society actively advocated for

getting rid of them. The universal term for this through the mid-1950s was “disarmament”; by the end of that decade, a new category, “arms control,” had taken over. “Arms control” merged the cybernetic discourse of regulation with a worldview that treated the weapons as ineradicable, something that could only be moderated through careful management (somewhat like high blood pressure). The framework of arms control, installed by the Kennedy Administration in 1961 within the State Department as the Arms Control and Disarmament Agency, represented a decisive shift by the US government away from multilateral diplomacy within the UN to a series of bilateral approaches that would freeze most of the world out of the nuclear conversation.

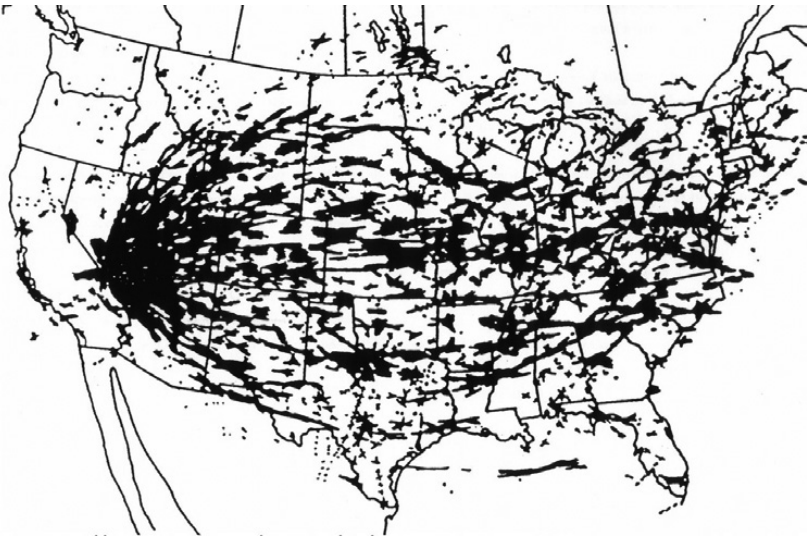
On January 24, 1946, the UN adopted Resolution 1 (I) by consensus, demanding “the elimination from national armaments of atomic weapons and all other major weapons adaptable to mass destruction.”³ Thus the new world order the United States spearheaded began at cross-purposes with the national security establishment it was simultaneously erecting. In June 1946, at the first meeting of the UN Atomic Energy Commission, US special envoy Bernard Baruch – an aged financier who had advised presidents since Wilson – put forward a plan revised from a template composed by Acheson and Lilienthal, and based on Oppenheimer’s ideas. The plan proposed an international atomic energy authority that would proscribe nuclear weapons and enforce that ban through the UN, with extraordinary powers to violate national sovereignty. The Baruch Plan contained two important provisos. First, the permanent members of the Security Council would not be permitted to veto enforcement actions against suspected violators – which of course worried the Soviet representative, Andrei Gromyko, given that the Soviet Union was actively trying to acquire its own atomic bombs. Second, it promised American disarmament *after* the accords went into effect. In short, the United States would remain the atomic monopolist until everyone else had no opportunity to develop such weapons, and then would divest its arms. Gromyko quickly counterproposed with immediate global disarmament, and the debate stalled until it quietly died in November 1949. This marked the end of US-led disarmament efforts.

Outside the corridors of power, there was substantial mobilization against nuclear weapons. Globally, a “ban the bomb” movement picked up from prewar disarmament ventures, arguing about political stability and

³ Quoted in *Foreign Relations of the United States, 1946: Volume I, General, the United Nations* (Washington, DC, 1972), 363.

nonviolent dispute resolution. Extensive (and covert) Soviet sponsorship pushed the main thrust of this movement to focus more centrally on nuclear weapons instead of a general campaign against war, and thus the Soviet Union's 1949 acquisition of its own weapons muddied some of the conceptual clarity of the Left. Nonetheless, on March 15, 1950, French nuclear physicist (and communist) Frédéric Joliot-Curie's Stockholm Appeal was approved by the World Peace Council, demanding an absolute ban on nuclear weapons. (Over a quarter of a billion people, including all adults in the Soviet Union, allegedly signed it.) Within the United States, a vocal group of "atomic scientists," rapidly organized into what would become the Federation of American Scientists, published from 1946 the *Bulletin of the Atomic Scientists*, an important venue where many of these topics were aired. Their experience as Manhattan Project veterans understandably encouraged a concentration on nuclear weapons as distinct from other arms. At first, they had little direct impact on policy, but later would promote the transnational Pugwash movement and other very influential arms control and peace efforts.

A surprising development in the non-state discussion of nuclear disarmament within the United States came not from those worried about weapons *per se*, but rather about nuclear *testing*. The first nuclear explosion took place in New Mexico, but until the Soviet Union detonated a device, all the rest of the American tests were in the South Pacific. Starting in 1950, in part due to security concerns, the AEC moved much nuclear testing to Nevada, with South Pacific testing coming to a halt in the mid-1950s, largely in reaction to the *Lucky Dragon* incident in March 1954, when a Japanese fishing vessel was irradiated with fallout from the Castle Bravo test. (In turn, public outcry in Japan at its citizens again being subjected to American radiation sparked the vigorous anti-nuclear movement in that country.) The vocabulary of nuclear "testing" distracts from the fact that, in practice, the explosions in Nevada amounted to the US bombing itself, repeatedly. These detonations of course produced their own fallout, initially believed to impact only local "downwinders": predominantly poor, minority, and Native American populations in Utah. Then radioactive isotopes began to show up farther afield, including in the affluent suburban Northeast. Milk was found to contain the radioactive isotope strontium-90, which substituted for calcium in bones and teeth and risked lasting health damage to children. White, middle-class opposition raised significant grassroots pressure and aligned with scientists' groups to argue for a stop to atmospheric testing. Meanwhile, persistent African American protests against the nuclear complex were systematically marginalized by both the national security establishment and the civil rights



Map 3.1 Area crossed by two or more radioactive clouds during the era of nuclear testing (1951–1962). Source: Richard L. Miller; used by permission.

movement. Lewis Strauss, now head of Eisenhower's AEC, claimed that atmospheric testing was crucial to maintaining the reliability of the nuclear arsenal. The fallout debate distinguished itself from the disarmament movement in that it focused on health and, to a lesser extent, environmental harms of the nuclear complex. Eisenhower became interested in exploring a way to end testing, at least in the atmosphere.

Fallout, by its nature, ignores national borders, and mobilization began on multiple international fronts. Only weeks after Castle Bravo, Indian Prime Minister Jawarhalal Nehru called for a moratorium on nuclear testing; the Soviet Union proposed a test ban at the UN the following year. Both the Americans and the Soviets instituted moratoria on testing, and both violated them in the early 1960s due to Cold War tensions and concerns about whether a ban on atmospheric testing would be enforceable. Consistent public pressure proved essential to keeping the item on the agenda in international forums, and negotiations restarted in earnest after the Cuban crisis. The Limited Test Ban Treaty (LTBT) was signed in August 1963 by the United States, United Kingdom, and Soviet Union, and went into force in

October, banning nuclear tests in the atmosphere, outer space, and under water.

A few legacies of the LTBT – the first significant nuclear treaty under the new framework of “arms control” – are important to underscore. The first is that this was a trilateral treaty among nuclear powers, who pledged to move their nuclear tests underground. (The Americans let the British use the Nevada testing site.) This removed nuclear discussion from the UN’s purview and put arms control in the hands of diplomats within nation-state contexts. Second, it was not comprehensive either in terms of nuclear tests or even nuclear powers. France was the only extant nuclear power that did not join, and China did not join once it began testing. (Both would stop their atmospheric testing only after the Cold War, under intense international pressure.) Finally, the mobilization around fallout marked the emergence of the modern environmental movement, and the techniques that were effective here were then extended to a number of other issues. Rachel Carson’s *Silent Spring*, so influential in encouraging regulation of chemical pollution and especially pesticides, began with an analogy between chemical winds and fallout. By co-opting fallout to make broader points, however, these advocates somewhat decentered atomic matters. Moving underground worked – global radiation levels dropped – and the domestic coalition of citizens moved on to other topics. After 1970, a strengthened environmental movement would again focus on the health and environmental impacts of the nuclear complex (notably in the United Kingdom and West Germany), and this has become a major narrative in the post-Cold War era. The state-centric focus began to narrow to the question of nuclear stability and an emergent category: “proliferation.”

Not coincidentally, this transition to overwhelming panic about the potential expansion of the number of nuclear-capable states – “horizontal proliferation,” as opposed to the “vertical proliferation” of ever-larger arsenals – gained significant traction in the wake of the Chinese nuclear test of 1964, the first test by a state dominated by non-whites. Nuclear strategists deployed a conceptual armature already developed in the late 1950s to think about what was sometimes termed “nuclear diffusion” through game-theoretic analyses of the so-called “Nth-country problem.” The question was framed in terms of geopolitical stability: what number of nuclear states (N) would tip the stalemate into global conflagration? The world had seemed stable with one nuclear power, and then with two, but at decade’s end there were three, and estimates for the future ranged as high as thirty. Canada, Sweden, Switzerland, West Germany, South Korea, Taiwan, Brazil, Argentina, and others had considered the option and rejected it

due to internal or external pressure. The importance of that pressure has long been underestimated, and the fact that the “nuclear club” includes only nine nations today is in part testament to how seriously the United States in particular took this concern in each of the above cases, as well as in those instances where it failed to prevent the acquisition of weapons (India, Israel, Pakistan, South Africa). The Chinese test at Lop Nur brought these anxieties to the surface, and the Soviet Union and the United States once again found a nuclear topic on which they could agree: limiting the spread of the militarized atom. They began negotiations on a treaty structure to secure that goal.

One of the most noteworthy features of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), signed in July 1968 and effective as of March 1970, was how rapidly it was assembled. The US and Soviet delegations began negotiations in March 1962 at the Eighteen Nation Disarmament Conference in Geneva, but events like Cuba, Kennedy’s assassination, and Khrushchev’s ouster delayed detailed talks until 1966. That year, President Johnson agreed to cancel the Multilateral Force, which would have shared strategic nuclear weapons with NATO countries including West Germany, a sticking point for the Soviets. As early as August 1967 the treaty was opened to the rest of the world for further discussion. Throughout, the two superpowers dominated, and the treaty was specifically structured to ensure that dominance.

The treaty, like the logic of “proliferation” itself, is discriminatory, dividing the world into “haves” and “have-nots.” Articles I and II guarantee that all signatories refuse to develop or assist any nation in the development of nuclear weapons – except for the five *de jure* nuclear powers: the United States, the Soviet Union, the United Kingdom, France, and the People’s Republic of China. In what has since been termed by critics “nuclear apartheid,” the haves are put under a different legal regime than the rest; for them, nuclear weapons are licit. In exchange for acceding to this system, the rest of the world was granted two blandishments. Article IV, based on a late 1967 proposal from Mexico, requires the haves to assist the have-not nations in developing peaceful nuclear technology, a globalized version of Atoms for Peace. Article VI demands that the nuclear powers make good faith efforts to eliminate nuclear weapons. Essentially every article of this treaty has been violated at some point or other, but in general the framework has proven impressively stable. Nonproliferation thus remains – after the treaty’s 1995 indefinite extension and with 190 signatories – *the* articulation of the global nuclear regime.

All three of the strands discussed in this chapter – intelligence, arsenals, and ideology of nonproliferation – were inseparable in the nuclear regime that was erected by 1970, twenty-five years after the destruction of Hiroshima and Nagasaki, and they remain intertwined at present. Each evolved at first contingently and to some degree independently, only becoming fully yoked together in the 1960s. Even through to the late 1950s there were alternatives, such as attention to environmental and health risks and their differential distribution around the globe. After the LTBT, the environmental and nuclear streams separated, and the latter became increasingly entrenched both along an East–West axis – the Cold War, which ended with the collapse of the Soviet Union in December 1991 in the midst of a series of increasingly sweeping arms control treaties – and a North–South one.

While civilian nuclear power never turned into the panacea for development, a number of ambitious states yoked their aspirations to the militarized atom. India detonated a nuclear device (“Smiling Buddha”) in Rajasthan on May 18, 1974, with the government maintaining that the explosion was “peaceful” and did not necessarily indicate a nuclear arms race. The Shah’s government in Iran similarly explored the ambiguous zone between latency and proliferation in the 1970s; the 1979 revolution froze these developments, but the early twenty-first century has witnessed a resurgence of Iranian interest in this fuzzy boundary. Pakistan tested its first nuclear device at Ras Koh in the province of Balochistan on May 28, 1998, in direct response to India’s second round of nuclear tests two weeks previously. South Africa assembled a functional nuclear weapon – partially in cooperation with the Israelis, who are widely believed to have started their (to date unacknowledged) nuclear arsenal in the late 1960s – but dismantled the warheads with the transition from apartheid in 1989. (Likewise, post-Soviet Ukraine, Belarus, and Kazakhstan returned the weapons on their territories to Russia in the early 1990s.) The most recent proliferation as of this writing is North Korea’s, in 2006.

Visible in that list are movements both toward and away from nuclearized geopolitics. Some states acquire weapons, others back away – even, in the case of Germany, from civilian nuclear power altogether after the 2011 reactor meltdown in Fukushima, Japan. Embers of the ban-the-bomb movement have recently reignited with the Treaty on the Prohibition of Nuclear Weapons, passed on July 7, 2017 – with the non-participation of both nuclear-weapons states and the “umbrella nations” (like Japan) that rely on extended deterrence. The treaty was an explicit revival of arguments built around environmental and health harms. Nonetheless, as continued nuclear

invocations by the United States and others indicate, the framework of consolidation established by 1970 has remained remarkably robust.

Bibliographic Essay

Every history of the nuclear age was necessarily written during the nuclear age. This seeming tautology is profoundly important in approaching the literature. A history of Harry Truman's decision to authorize the building of thermonuclear weapons signifies differently if it was written right after the US-Soviet SALT accords, or during the 1980s Reagan buildup, or in light of India's test of its own hydrogen bomb in 1998. All secondary sources are primary sources for different projects. Reading them with an awareness of this doubling provides a deeper contextualization of the loops and repetitions of the nuclear era.

Much of the literature on the history of nuclear weapons has to navigate between two forces that shape the resulting narratives: the official secrecy that inhibits access to primary sources, and the political-science literature that structures assumptions about the weapons. On the origins and development of the secrecy regime, see Alex Wellerstein, *Restricted Data: The History of Nuclear Secrecy in the United States* (Chicago, 2021). The most prominent political-science model is that of the "nuclear revolution," the *locus classicus* of which is Robert Jervis, *The Meaning of the Nuclear Revolution: Statecraft and the Prospect of Armageddon* (Ithaca, NY, 1989).

For older but still very useful accounts of the domestic politics of the 1940s and public discourse related to nuclear weapons, see Gregg Herken, *The Winning Weapon: The Atomic Bomb in the Cold War, 1945–1950* (New York, 1980); and Paul S. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age* (New York, 1985).

On nuclear intelligence, see Michael D. Gordin, *Red Cloud at Dawn: Truman, Stalin, and the End of the Atomic Monopoly* (New York, 2009); and Jeffrey T. Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to North Korea* (New York, 2006). On the implications of internal security for the scientific community, see David Kaiser, "The Atomic Secret in Red Hands? American Suspicions of Theoretical Physics during the Early Cold War," *Representations* 90, no. 1 (Spring 2005): 28–60. On the Rosenbergs, the best recent study is Lori Clune, *Executing the Rosenbergs: Death and Diplomacy in a Cold War World* (New York, 2016).

Much of the scholarship about the growth of the arsenal and the rise of nuclear strategy is framed as diplomatic history, and approaches much closer to the boundary with political science. Especially useful are: David Alan Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy, 1945–1960," *International Security* 7, no. 4 (Spring 1983): 3–71; Francis J. Gavin, *Nuclear Statecraft: History and Strategy in America's Atomic Age* (Ithaca, NY, 2012); and Edward Kaplan, *To Kill Nations: American Strategy in the Air-Atomic Age and the Rise of Mutually Assured Destruction* (Ithaca, 2015). On nuclear strategy, see S. M. Amadae, *Prisoners of Reason: Game Theory and Neoliberal Political Economy* (New York, 2016). On the development of Soviet nuclear weapons, the essential book remains David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939–1956* (New Haven, Conn., 1994). The opening of Soviet-era archives has produced a landslide of material globalizing the Cuban Missile Crisis. For an entry point, see Sergo Mikoyan, *The*

The Consolidation of the Nuclear Age

Soviet Cuban Missile Crisis: Castro, Mikoyan, Kennedy, Khrushchev, and the Missiles of November, ed. Svetlana Savranskaya (Stanford, Calif., 2012). On presidential power and nuclear weapons, see Elaine Scarry, *Thermonuclear Monarchy: Choosing between Democracy and Doom* (New York, 2014). On civil defense across the Iron Curtain, see Edward M. Geist, *Armageddon Insurance: Civil Defense in the United States and Soviet Union, 1945–1991* (Chapel Hill, NC, 2019).

For a positive account of the transition from “disarmament” to “arms control,” see Jennifer E. Sims, *Icarus Restrained: An Intellectual History of Nuclear Arms Control, 1945–1960* (Boulder, Colo., 1990). A darker and more transnational version is offered in Shane J. Maddock, *Nuclear Apartheid: The Quest for American Atomic Supremacy from World War II to the Present* (Chapel Hill, NC, 2010). An indispensable conceptual reference on globalizing nuclear history remains Itty Abraham, “The Ambivalence of Nuclear Histories,” *Osiris* 21, no. 1 (2006): 49–65. For books that decentralize American nuclear hegemony transnationally and domestically, see, respectively: Gabrielle Hecht, ed., *Entangled Geographies: Empire and Technopolitics in the Global Cold War* (Cambridge, Mass., 2011); and Vincent J. Intondi, *African Americans against the Bomb: Nuclear Weapons, Colonialism, and the Black Freedom Movement* (Stanford, Calif., 2015).