

U.S. Cold War Nuclear Attack Target List of 1200 Soviet Bloc Cities “From East Germany to China”, Declassified

By [William Burr](#)

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According to 1956 Plan, H-Bombs were to be Used Against Priority “Air Power” Targets in the Soviet Union, China, and Eastern Europe.

Major Cities in Soviet Bloc, Including East Berlin, Were High Priorities in “Systematic Destruction” for Atomic Bombings.

Plans to Target People (“Population”) Violated International Legal Norms.

SAC Wanted a 60 Megaton Bomb, Equivalent to over 4,000 Hiroshima Atomic Weapons.

The SAC [Strategic Air Command] Atomic Weapons Requirements Study for 1959, produced in June 1956 and published today for the first time by the National Security Archive www.nsarchive.org, provides the most comprehensive and detailed list of nuclear targets and target systems that has ever been declassified. As far as can be told, no comparable document has ever been declassified for any period of Cold War history.

The SAC study includes chilling details. According to its authors, their target priorities and nuclear bombing tactics would expose nearby civilians and “friendly forces and people” to high levels of deadly radioactive fallout. Moreover, the authors developed a plan for the “systematic destruction” of Soviet bloc urban-industrial targets that specifically and explicitly targeted “population” in all cities, including Beijing, Moscow, Leningrad, East Berlin, and Warsaw. Purposefully targeting civilian populations as such directly conflicted with the international norms of the day, which prohibited attacks on people per se (as opposed to military installations with civilians nearby).

The National Security Archive, based at The George Washington University, obtained the study, totaling more than 800 pages, through the Mandatory Declassification Review (MDR) process (see sidebar).

The SAC document includes lists of more than 1100 airfields in the Soviet bloc, with a priority number assigned to each base. With the Soviet bomber force as the highest priority for nuclear targeting (this was before the age of ICBMs), SAC assigned priority one and two to Bykhov and Orsha airfields, both located in Belorussia. At both bases, the Soviet Air Force deployed medium-range Badger (TU-16) bombers, which would have posed a threat to NATO allies and U.S. forces in Western Europe.

A second list was of urban-industrial areas identified for “systematic destruction.” SAC listed over 1200 cities in the Soviet bloc, from East Germany to China, also with priorities established. Moscow and Leningrad were priority one and two respectively. Moscow included 179 Designated Ground Zeros (DGZs) while Leningrad had 145, including “population” targets. In both cities, SAC identified air power installations, such as Soviet Air Force command centers, which it would have devastated with thermonuclear weapons early in the war.

According to the study, SAC would have targeted Air Power targets with bombs ranging from 1.7 to 9 megatons. Exploding them at ground level, as planned, would have produced significant fallout hazards to nearby civilians. SAC also wanted a 60 megaton weapon which it believed necessary for deterrence, but also because it would produce “significant results” in the event of a Soviet surprise attack. One megaton would be 70 times the explosive yield of the bomb that destroyed Hiroshima.

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SAC Nuclear Planning for 1959

SAC’s top priority for destruction was Soviet “air power” because of the apparent immediate threat that Soviet bombers posed to the continental United States and to U.S. forces in Europe and East Asia. The report’s detailed introduction explained that the priority given to Air Power (BRAVO) targets dictated the surface bursting of high-yield thermonuclear weapons to destroy priority targets, including airbases in Eastern Europe. That tactic would produce large amounts of radioactive fallout compared to bursting weapons in the air. According to the study, “the requirement to win the Air Battle is paramount to all other considerations.”

The “greatly compressed time factor”—the danger of a speedy Soviet attack and counterattack—encouraged targeters to require the surface bursting of high-yield nuclear weapons. According to SAC, bursting the weapon in the air would “result in decrease of blast effect.” Detonating the weapon on or close to the ground would maximize blast effects, destroy the target, and disperse irradiated particles which would be picked up by winds and descend far and near.[1]

According to the study, SAC planners placed “prime reliance” on blast effects, finding that thermal and radiation effects were “relatively ineffective.” As Lynn Eden has demonstrated in her study, *Whole World on Fire*, the Air Force’s World War II experience encouraged target planners to emphasize blast effects when they tried to estimate the damage that nuclear weapons would cause. The resulting “blast frame” of mind overlooked the significant devastation caused by other nuclear weapons effect such as radiation and mass fires. [2]



Believing that a “favorable decision may be reached in the initial stages” SAC thought it essential to achieve high levels of damage. Accordingly, target planners wanted to be sure that enough firepower was launched to assure a 90 percent chance of destroying targets in the airpower category: collapsing above-ground structures or cratering airbase runways and underground facilities.

SAC laid out the numbers and types of nuclear weapons required to destroy each DGZ. The nuclear weapons information is completely excised from the report making it impossible to know how many weapons SAC believed were necessary to destroy the various targets. In any event, SAC could anticipate a very large stockpile of nuclear weapons by 1959 to target priority objectives. This was a period when [the nuclear weapons stockpile](#) was reaching large numbers, from over 2400 in calendar 1955 to over 12,000 in calendar 1959 and reaching 22,229 in 1961.

The Air Power and Systematic Destruction lists were not final lists of targets for a military plan. Nuclear war planning was always in a state of change because new intelligence information would become available and change the understanding of which targets had greater priority. It is clear that SAC anticipated further refinement of target lists. The target study included language about the “nomination” of objectives in all of the areas, Soviet Union, China, and the Eastern European satellites, which were responsive to the goal of destroying air power and “war-making” capability.

Air Power Target System

SAC’s top priority for destruction, the Soviet bloc’s air power, was a complex target system. Before the Soviet Union acquired the atomic bomb and significant capability to deliver nuclear weapons at long distances, SAC’s priority had been the destruction of the Soviet urban-industrial complex, but during the mid-1950s the “greatly compressed time factor” produced a reversal.[3] In the *SAC Atomic Weapons Requirements Study for 1959*, SAC broadly defined the “Air Power” target: air and missile bases for strategic and tactical forces, defensive and offensive, but also government and military control centers that would direct the air battle and nuclear weapons storage sites, air industry, atomic industry, and petroleum-oil-lubricants (POL) storage areas. To this extent, the Air Power category cut across some of the major categories of target systems that Pentagon planners had developed in the early 1950s: strategic nuclear (BRAVO category), conventional forces

(ROMEO category), and urban-industrial (DELTA).[4]

Given the expansive definition of Air Power, this suggested that targets in major cities such as Moscow and Leningrad could be subjected to H-bomb attack because both were rich in air power targets. For example, according to the SAC study, the Moscow area had 12 airbases. None of them were even in the top 400 airbases on the list so they may not have been attacked immediately, but Moscow had other potentially higher priority targets: 7 Air Force storage areas, 1 Air Force military control, 1 government control (presumably Kremlin and vicinity), 4 guided missile entities (R&D, production), 5 atomic energy research centers, 11 airframe entities, 6 aircraft engine entities, 2 liquid fuel plants, and 16 liquid fuel storage areas, including refineries. Moreover Moscow had a variety of other non-air military objectives, such as an Army military headquarters, Army and Navy military storage areas, and biological warfare research centers that might have been deemed worthy of attack at the opening of the war.

Leningrad was also a prime candidate for high-yield nuclear weapons aimed at air power targets. It had 12 airbases in the vicinity, as well as such installations as: 1 air frame , 1 aircraft engine, 2 atomic energy research, 2 guided missiles, 3 liquid fuel, 1 Air Force military control, and 4 Air Force military storage areas.

At the heart of the Air Power target system were bases for bombers, missiles, and air defenses. The *SAC Atomic Weapons Requirement Study* listed alphabetically over 1100 air fields, with a priority number assigned to each. As noted earlier, the number one and number two priority bases on the list were in Belarus—Bykhov and Orsha (a.k.a. Balbasova)—as were four others in the top 20: Baranovich, Bobruysk (or Babruysk), Minsk/Machulische, and Gomel/Prybytki. Seven of the top 20 were in the Ukraine: Priluki (Pryluky), Poltava, Zhitomir/Skomorokhi, Stryy, Melitpol, Melitpol, and Khorol. Six were in Russia: Pochinok (Shatalovo), Seshcha, Ostrov (Gorokhov), Soltsy, Spassk Dalniy, and Vozdzenhenka. One airfield, Tartu (number 13 in priority), was in Estonia.

Declassified CIA documents suggest why Bykhov and Orsha had such high prominence on the target list. Months before the list was prepared, the CIA's [*Current Intelligence Bulletin*](#) published an article indicating "Western" military attachés had seen Bison (M-4) jet bombers at Bykhov and possibly also at Orsha, although uncertainty existed as to whether the espied aircraft were Badger [Tu-16] or Bison bombers. In fact, Orsha was becoming a site for Badger bombers, which were slated for strike missions in nearby theaters, such as Western Europe, where they would have posed a threat to NATO allies and U.S. forces. Despite Washington's fears, the M-4 could not reach the United States on two-way missions (it lacked the technology for aerial refueling), but multiple flyovers of Red Square during a 1954 military parade created fears of a "bomber gap" in Washington. Bykhov was a base for Badger bombers but later became prominent as a base for medium-range ballistic missiles (MRBMs) so it was sure to remain a high priority target [5]

The 3M (Bison-B), successor to the M-4 and the Tu-95M (Bear), gave the Soviets their "first real intercontinental capability." The Bear was becoming operational, although it had significant technical problems. The Soviet air force deployed Bears at only a handful of bases, but they were among the top 100 airfields targeted by SAC—for example, Mozdok (number 34) and Semipalitinsk (number 69).[6]

According to the SAC study, each airfield was one DGZ [designated ground zero]. Some targets, however, appeared in the war plans of more than one command. For SAC some

element of duplication was “desirable and necessary” to assure the destruction of urgent targets in the event that one command or the other could not destroy them. Therefore, the duplications were “confined to higher priority air fields.”

The “Final Blows”



If fighting continued once the air power battle was over, the second phase of the war was to be the “systematic destruction” of Soviet bloc war-making potential. The “final blows” in the bombing campaign would strike “basic industries”—those industries and economic activities which most contributed to war-making capability. This was consistent with Air Force ideas dating back to World War II and earlier that the destruction of key nodes in a society’s industrial fabric could cause its collapse. Toward that end, SAC would drop atomic bombs, not H-bombs, on large numbers of specific installations in designated urban-industrial areas.

General Curtis LeMay, Commander-in-chief of the Strategic Air Command when SAC Atomic Weapons Requirements Study for 1959 was prepared. [Photo source: U.S. National Archives, Still Pictures Division, RG 342B, Box 507 B&W]

As the SAC study indicates, [Mark 6 \(B and C\) atomic bombs](#), implosion weapons with explosive yields of up to 160 kilotons—some eight times the yield of the “Fat Man” weapon which destroyed Nagasaki—were assigned to the “systematic destruction” mission. The explosive yields of these bombs were likely to exceed by far the requirements of destroying specific targets in the systematic destruction mission, such as power plants or transportation nodes.[7]

Moscow, the number one urban target, had around 180 installations slated for destruction; some were in the air power category, but many involved a variety of industrial activities, including factories producing machine tools, cutting tools, oil extraction equipment, and a most vital medicine: penicillin. Other targets involved significant infrastructural functions: locks and dams, electric power grids, railroad yards, and repair plants for railroad equipment. SAC might not have targeted each installation with a bomb but may have used the concept of “[target islands](#)” whereby adjacent installations were targeted at a central aiming point. SAC may have assigned more than one weapon to large industrial complexes, however, because they were regarded as several installations.

What is particularly striking in the SAC study is the role of population targeting. Moscow and

its suburbs, like the Leningrad area, included distinct “population” targets (category 275), not further specified. So did all the other cities recorded in the two sets of target lists. In other words, people as such, not specific industrial activities, were to be destroyed. What the specific locations of these population targets were cannot now be determined. The SAC study includes the *Bombing Encyclopedia* numbers for those targets, but the *BE* itself remains classified (although under appeal).

The SAC study does not include any explanation for population targeting, but it was likely a legacy of earlier Air Force and Army Air Force thinking about the impact of bombing raids on civilian morale. For example, in a 1940 Air Corps Tactical School lecture, Major Muir Fairchild argued that an attack on a country’s economic structure “must be to so reduce the morale of the enemy civilian population through fear—of death or injury for themselves or loved ones, [so] that they would prefer our terms of peace to continuing the struggle, and that they would force their government to capitulate.” Thinking along those lines continued into the post-war period when social scientists studied the possible impact of nuclear bombing on civilian morale.[8]

Whatever SAC planners had in mind, attacks on civilian population per se were inconsistent with the standards followed by Air Force leaders. While they were willing to accept mass civilian casualties as a consequence of attacking military targets, as was the case during the Korea War, they ruled out “intentional” attacks on civilians. Moreover, attacks on populations violated international legal norms of the day, which were summarized in the then-unratified Hague rules on aerial warfare (1923). Nevertheless, such targeting rules were not in force until the 1977 agreement on the Additional Protocols to the Geneva Convention (1949). The United States, however, has consistently refused to accept claims that the targeting standards of the Additional Protocols apply to the use of nuclear weapons.[9]

The “systematic destruction” category would be struck with atomic weapons only. As suggested, that might not have made much difference for cities like Moscow and Leningrad which had numerous air power targets, along with the surrounding population, which may well have already been destroyed with thermonuclear weapons. This planning occurred years before U.S. defense officials decided that there should be a “withhold” option to spare Moscow in order to leave someone to negotiate with.

How long, and to what extent, SAC planners followed war plan with major phases of Air Power and Systematic Destruction is unclear. The priority given to Air Power priority posited the thermonuclear destruction of relevant military targets in Moscow and Leningrad, but that implied the simultaneous devastation of any nearby installations that had been slated for “Systematic Destruction” at a later stage of the conflict. Whether SAC officers saw that as a problem or not, by the late 1950s, Pentagon planners were thinking in terms of an “optimum mix” war plan which sought rapid, but simultaneous, destruction of important military and urban-industrial targets, although giving priority to the Air Power target system in terms of numbers of DGZs.[10]

Eastern European Targets

The *SAC Atomic Weapons Requirements Study for 1959* stipulated that with exceptions SAC would use lower-yield atomic bombs against targets in Eastern Europe. Apparently this was for “political” and “psychological” reasons, to differentiate those countries from the Soviet Union through somewhat less destructive bombing. The exception was air power targets:

because of the primacy of that category, such targets in Eastern Europe were scheduled to be destroyed by high-yield thermonuclear weapons. For example, according to the SAC target list, Brieg and Modlin airfields, located near Warsaw, were 31st and 80th in priority respectively. Tokol airport near Budapest was 125th in priority, therefore a likely target. Thus, urban populations in Eastern Europe would be exposed to the fallout and other effects of thermonuclear weapons, eroding much of the distinction between targets in that region and targets in the Soviet Union itself.

East Germany was the site of major Soviet airbases and East Berlin itself was a target for “systematic destruction.” A sampling of the SAC airfields list finds more than a few Soviet-operated installations among the top 200, with some not very far from Berlin. Among them were Briesen (number 140), Gross Dolln (Templin) (number 70), Oranienberg (number 95), Welzow (number 96), Werneuchen (Verneuchen) (number 82). For example, [Oranienberg](#), which was then a base for Il-28 (Beagle) bombers, is only 22 miles (34 kilometers) north of Berlin. Gross Dolln (Templin), originally a base for Il-28 bombers and later for Soviet fighter aircraft, is 55 miles (66 kilometers) north of Berlin. Werneuchen (number 82), a base for interceptors and fighter/bombers, is about 22 miles (33 kilometers) northeast. Presumably those bases would have been targeted with thermonuclear weapons which could have subjected the Berlin area to tremendous danger, including radiation hazards.

East Berlin had a priority ranking of 61 in the list of urban-industrial slated for “systematic destruction.” The SAC study identified 91 DGZs in East Berlin and its suburbs: a wide range of industries and infrastructural activities including electric power, railroad yards, liquid fuel storage, machine tools, and radio and television stations. In addition, East Berlin and its suburbs included “population” targets, as did Warsaw (target priority 62.) The atomic bombing of East Berlin and its suburbs would very likely have produced fire storms, among other effects, with disastrous implications for West Berlin. Whether SAC conducted studies on the vulnerability of West Berlin to the effects of nuclear attacks on East Berlin or in other East German targets is unknown.

China

Whether China was fighting on the Soviet side or not in a war, SAC treated it as part of the Soviet bloc and listed Chinese airfields and cities in the target lists, including Beijing. Of the list of targets scheduled for “systematic destruction,” Beijing [Peiping in Wade-Giles transliteration] was in the top 20 (number 13) with 23 DGZs. The list included several Air Power targets, including two Air Force military control centers and two Air Force storage areas. The location of those installations suggests that Beijing would have been targeted with thermonuclear weapons early in the war. For Beijing and its suburban district Fengtai, SAC identified various infrastructural and military DGZs, including “Population” targets.

Target Lists

SAC Atomic Weapons Requirements Study for 1959 provides two target lists. The Department of Energy has excised the numbers and types of weapons assigned to various DGZs in both of them but some general information about them has been declassified. The first list, Part I, consisted of 3400 DGZs—the “SAC Target System,” which suggested that it was the sum total of all targets then considered to be eligible. The list was “unrestricted” apparently because a large supply of fissionable material would be available for the weapons assigned to the targets. Taking into account duplicate targets in the Air Power

category, the attack plan would have required more than 3400 weapons but that number remains classified.

The second list, Part II, consisted of 1209 DGZs targeted by a larger but classified number of nuclear weapons. Part of the description for part II is excised so the reasoning behind it cannot be explained, but it was a “restricted” target list. According to the study, the “weapons are programmed against targets on the basis of 69,000 [kilograms] of oralloy equivalent (76 tons US).” Oralloy [Oak Ridge alloy] was a term of art for highly-enriched uranium. “Oralloy equivalent” may refer to the total amount of HEU and plutonium (PU) that was available to fuel the atomic bombs and H-bombs slated to inflict the desired level of destruction. Seventy-six tons conveys the significant quantities of fissile material required for the atomic bombs and the first generation of two-stage thermonuclear weapons.

The 3400 and 1209 DGZs in the unrestricted and restricted lists are worth comparing with the first Single Integrated Operational Plan (SIOP), the war plan prepared in 1960 by the SAC-controlled Joint Strategic Target Planning Staff. If the U.S. had strategic warning of a Soviet attack, it would preemptively strike with a full force of 3500 weapons against an “optimum mix” of 1050 DGZs, including strategic air, missile bases, air defenses, and 151 urban-industrial targets. Attrition and multiple weapons against priority targets accounted for the discrepancy between the number of weapons and the number of DGZs.[11]

Delivery Systems

To deliver the weapons to targets, SAC would use bombs and missiles. For bomber delivery systems, SAC would use B-47s, based in the United Kingdom, Morocco, and Spain, and intercontinental B-52s, which were just beginning to be deployed in the continental U.S.

SAC listed four missile types for delivering nuclear warheads: the Snark, the Rascal, the Cross Bow, and IRBM [Intermediate Range Ballistic Missile]. The Snark, an early intercontinental ground-launched cruise missile, was only briefly deployed, during 1959, because it was a fiasco (areas in the Atlantic Oceans where the missiles crashed were called “Snark infested waters”). The Rascal (replaced by the Hound Dog in 1958) and Cross Bow were both bomber-launched missiles, with the Crossbow targeting radars.

President Eisenhower had made IRBMs, along with ICBMs, a national priority, but in 1956 the IRBM was still projected for the future. With a range of up to 1700 miles (1500 n.m.), deployment overseas would be necessary and the Air Force envisaged stationing them in the United Kingdom, although talks with the British had yet to begin. The Air Force would eventually deploy liquid-fueled Thor IRBMs in the United Kingdom during 1960-1963, while Jupiter missiles were stationed in Italy and Turkey during 1961-1963 (removed as part of the Cuban Missile crisis settlement).[12]

SAC also identified the atomic bombs and the thermonuclear weapons that would be mated to the delivery systems. They would be Mark 6 (B and C) atomic weapons and Mark 15, 27, and 36 thermonuclear weapons. The latter had extraordinarily massive explosive yields: MK 15: 1.6 to 3.9 megatons; MK 27: 2 megatons, and MK 36: 9 to 10 megatons. These compare with the size of the U.S. nuclear tests in [Operation Castle](#) during 1954, in which actual explosive yields (not counting one fizzle) ranged from 1.7 to 15 megatons.

SAC wanted a 60-megaton bomb, but it was not programmed for this particular study. According to SAC, it was “essential, not only as a deterrent but also to ensure significant

results even with a greatly reduced force in the event of a Soviet surprise attack.” Discussion of ultra-high yield thermonuclear weapons continued during the 1950s and early 1960s so the concept of 60 megatons was not out of the ordinary in Air Force circles. Indeed, in a moment of enthusiasm Edward Teller proposed a [10-gigaton device](#), and in the early 1960s, in another outburst, he suggested yields up to a [1,000 megatons](#). A [25-megaton](#) bomb, the B-41, had the largest yield of any weapon in the U.S. stockpile and it stayed in service until the 1970s. The Soviets staged the [largest nuclear test in history](#) in late October 1961 with the 50-megaton “[Tsar bomba](#).”

Interpretative Problems

Using the category code table in the SAC study it is possible to go to the list of cities slated for the systematic destruction mission and determine how many installations and of what type SAC had in mind. For whatever reason, the two restricted and unrestricted target lists are not quite identical; for example, with respect to Moscow, there are minor variations in the types and numbers of installations itemized in the restricted and unrestricted target lists. A larger puzzle has to do with targets itemized at the beginning of the catalogs for the various cities identified in each of the two lists. For example, the beginning of the Moscow targets section in the unrestricted list includes 13 sets of numbers, beginning with 5545-03737, without category codes.

1 5150 MOSCOW		5545-03737	
		5545- 3737E	A
		5554- 3747E	AM
		5538- 3746E	AM
		5540- 3737E	AN
		5548- 3736E	B
		5542- 3726E	BC
		5549- 3729E	BE
		5558- 3728E	BL
		5554- 3802E	BM
		5544- 3746E	H
		5545- 3743E	J
		5546- 3751E	K
	054	0167-	
	054	0167-	
	227	0167-	
	227	0167-	
	227	0167-	
	227	0167-	
	227	0167-	
	227	0167-	

By contrast, the beginning of the Moscow target section in the restricted target list includes 7 sets of such numbers. Presumably, the numbers are from the *Bombing Encyclopedia*, but what they mean is uncertain. The same pattern can be found in other city listings. Also unclear are the letters in the DGZ [Designated Ground Zeroes] column; for example, at the beginning of the Moscow list above, A, AH, AM, AN, etc.

Archival location of the SAC study: U.S. National Archives, College Park, Record Group 242, Operational Planning, box 147, file B 89351

Note to readers:

Apparently the original version of *SAC Atomic Weapons Requirements Study for 1959* was published as a compendium of spread-sheets. To process this study for declassification, the National Archives and Records Administration scanned it so that the information would fit on 8 by 11 inch sheets of paper. To make this highly compressed PDF legible the reader will need to expand it to at least 150 percent of the text size. Excerpts from this huge study, which is about 800 pages in length, are presented below. For ease of use, the document has been broken down into sections, as separate PDFs, as follows:

1. [Title page, table of Contents and introduction.](#)

2. [Part 1 Unrestricted Allocation 22 and Cross-reference list \[excerpts\]](#)
3. [Category code list](#)
4. [Airfield list with weapons \[excerpts\]](#)
5. [Complex list with weapons \[excerpts\]](#)
6. [Part II Restricted allocation \[1209 DGZ's\] with airfields list and weapons \[complete list\]](#)
7. [Complex List with Weapons \[excerpts\]](#)
8. [IV Tabular Presentation \[As Outlined in Annex "C," Appendix SM 129-56\]:](#)
 - A. Atomic Weapons Requirements and Summary [PDF 1-6]
 - B. Desired Stockpile Composition [PDF 7-11]
 - C. Part I Telescoped Summary [PDF 12-13]
 - D. Part II Telescoped Summary [PDF 14-15]

Notes

Thanks to Michael Dobbs for his original MDR request and his suggestions about the posting, to Scott Sharon for his quantitative analysis of installations in major cities slated for targeting, to Gregory Grave for reviewing the numbers, to Steve Paschke for additional help with the spread sheets, and to Lynn Eden, Alex Wellerstein, and Stephen Schwartz for invaluable advice and comments.

[1] . The study's authors mistakenly asserted that "worldwide contamination is minimized when the surface burst is utilized." The anonymous authors may not have been scientists, but in light of the 1954 Castle Bravo test, which spread radioactive debris [globally](#), they should have known better.

[2] . Lynn Eden, *Whole World on Fire: Organizations, Knowledge, and Nuclear Devastation* (Ithaca: Cornell University Press, 2004).

[3] . For targeting during the early 1950s and changes in priorities, see David A. Rosenberg, "A Smoking Radiating Ruin at the End Of Two Hours": Documents on American Plans for Nuclear War with the Soviet Union, 1954-1955," *International Security* 6 (1981/82), 3-38.

[4] . For useful background on developments in SAC targeting during the 1950s, see Edward Kaplan, *To Kill Nations: American Strategy in the Air-Atomic Age and the Rise of Mutually Assured Destruction* (Ithaca, Cornell University Press, 2015), especially chapter four, "The Fantastic Compression of Time," at pages 77-107.

[5] . Steven J. Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Forces, 1945-2000* (Washington, D.C.: Smithsonian Institution Press, 2002), 24; Oleg Bukharin, Pavel Podvig, et al., *Russian Strategic Nuclear Forces* (Cambridge: MIT Press, 2001), 342.

[6] . Zaloga, *The Kremlin's Nuclear Sword*, 29.

[7] . For World War II bombing concepts, see Tami Davis Biddle, *Rhetoric and Reality in Air Warfare: The Evolution of British and American Ideas About Strategic Bombing, 1914-1945* (Princeton: Princeton University Press, 2002).

[8]. Ronald Schaffer, *Wings of Judgment: American Bombing in World War II* (New York: Oxford University Press, 1986), 31, 214. On population targeting, see also Jeffrey Richelson, "Population Targeting and U.S. Strategic Doctrine," in Desmond Ball and Jeffrey Richelson, eds., *Strategic Nuclear Targeting* (Ithaca: Cornell University Press, 1986), 234-249.

[9] . Matthew Evangelista and Henry Shue, eds., *The American Way of Bombing: Changing Ethical and Legal Norms from Flying Fortresses to Drones* (Ithaca: Cornell University Press, 2014), 36-37, 39, 58-60, and 62-63; David A. Rosenberg, "Nuclear War Planning," in Michael E. Howard et al., *The Laws of War: Constraints on Warfare in the Western World* (New Haven: Yale University Press, 1994), 165.

[10] . David A. Rosenberg, "The Origins of Overkill: Nuclear Weapons and American Strategy 1945-1960," 7 *International Security* (1983) 3-71. For JCS thinking in terms of a two-phase attack plan, see Kaplan, *To Kill Nations*, 98.

[11] . Rosenberg, "The Origins of Overkill," 6. See also Kaplan, *To Kill Nations*, 99, without citing source for numbers of weapons and targets.

[12] . For the history of the U.S. IRBM program, see Philip Nash, [*The Other Missiles of October: Eisenhower, Kennedy, and the Jupiters, 1957-1963*](#) (Chapel Hill: University of North Carolina Press, 1997).

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