

CHAPTER 12

NUCLEAR ISSUES: A TIME FOR DECISION

By the end of 1955 the Atomic Energy Commission and the Eisenhower Administration faced a wide range of policy issues that had emerged from efforts to develop nuclear energy for both peaceful and military purposes. On the military side, Cold War rhetoric continued to justify high priorities for developing and testing nuclear weapons, but the increasing tempo of atmospheric weapon tests both in Nevada and the Pacific had generated worldwide concerns over the dangers of radioactive fallout. Even more ominous was the specter of the thermonuclear weapon with its incredible potential for physical destruction and radioactive contamination. The enormity of this threat highlighted the difficult moral issues that had been created with the atomic bomb in 1945. Growing anxieties throughout the world and the rising sensitivity to the moral implications of nuclear warfare placed greater pressures on American leaders to consider both the feasibility of a nuclear test ban and the negotiation of nuclear disarmament.

Similar kinds of issues had arisen in the public consciousness since 1945 on the peaceful uses of the atom. The search for redeeming values in nuclear technology had prompted generous expenditures of public funds to develop various applications of radioisotopes in industry, agriculture, and medicine; some had been successful, but none had yet produced revolutionary effects. The greatest hope for peaceful applications was still nuclear power, but the dream of a cheap, clean, and reliable nuclear system still proved elusive. Thus, the old questions of the proper role of the federal government in developing nuclear power still remained to be answered.

No issue raised in the military or peaceful side was new. The Commission and the Eisenhower Administration had been struggling with the issues for three years, but in January 1956 they were taking a new dimension. By becoming more and more public issues of concern to people in everyday life, they were not just esoteric questions for high-level councils

of government. In the face of this growing public concern the Commission and the Administration felt increasing pressure to resolve some of these long-standing conundrums. That 1956 was an election year promised to stimulate political debate of nuclear issues, and, as the months wore on, it became more evident that for the first time in American history nuclear matters would gain prominence in a presidential campaign.

THE POLITICS OF NUCLEAR POWER

In 1955 Lewis Strauss had seen the Geneva conference as a triumph for both the American people and the Republican Administration, but, in fact, the conference had not provided the Commission with an enduring claim to superiority in power reactor technology. Within a matter of weeks after the conference the British made clear that Calder Hall, to be completed in 1956, would be only the first step in a startlingly ambitious plan to build twelve full-size nuclear power plants in Britain within a decade. When completed the nuclear complex was expected to produce 40 percent of British needs. In contrast, the first American plant, at Shippingport, would produce only 60,000 kilowatts and would not come on-line until 1957. Because the Americans would be relying on private industry to build nuclear power plants, there was no way that the Commission could commit itself to the British rate of nuclear power growth, or to any rate for that matter. By comparison, the Commission's predictions seemed little more than wishful thinking or the inflated claims of private industry. For Senator Anderson, Congressman Holifield, and other Democrats on the Joint Committee, Strauss's endorsement of industry's claims made them even less believable. In supporting the Dixon-Yates contract in 1954, Strauss had demonstrated to the satisfaction of Anderson and others his prejudice against public power. Anderson suggested that Strauss was working hand-in-glove with industry to thwart government projects.¹

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THE MCKINNEY REPORT

For months Anderson had been planning to make nuclear power a central issue when Congress reconvened in January 1956. By this time Robert McKinney and his panel had completed their report on the potential impact of the peaceful uses of atomic energy. The panel, appointed in March 1955, had been charged to make a nonpartisan study of nuclear policy, but from the beginning Anderson expected the group to lay the foundation for atomic energy planks in the Democratic platform for the 1956 campaign. This ulterior motive, however, scarcely influenced the outcome. McKinney assembled a competent staff that worked diligently for the better part of a year

with full cooperation from the Commission. The general manager funded a contract to support research for the panel and later estimated that the Commission's headquarters staff spent more than one thousand hours on the project.²

The panel's report in January 1956 did not criticize the Commission's efforts in reactor development as far as they went. McKinney and his colleagues, however, expressed strong doubts that the efforts of the Commission and private industry would be sufficient to develop nuclear power as fast as national security demanded. In that case, McKinney argued, "the Commission should support expeditious development, if necessary, even up to and including construction of one 'demonstration' plant of each major reactor size and type with public funds." This statement brought McKinney back to the position that Holifield, Price, and other Congressional Democrats had been holding for years. Even more, the report added fuel to the fire for a government-financed reactor program by setting forth assumptions about future national energy needs that constituted a dramatic imperative for quick action. "The growth of electric power," the report stated, "expresses in one simple index the American miracle of productivity and living standards." Thus, nuclear power could well be the key to the nation's economic future and "the most tangible symbol of America's will to peace." Forecasts of the annual growth rate of electrical generating capacity ranged from 4.9 to 7.5 percent over the next two decades. "The prospect of an indefinitely expanding national economy which may require as much as 600 million kilowatts of installed electric-generating capacity or more by 1980" seemed to give nuclear power a high priority.³

The panel also surveyed a wide range of other activities, including controlled thermonuclear energy, the uses of nuclear equipment and radioisotopes in medical, agricultural, and industrial research; and the application of nuclear power for the propulsion of commercial ships and aircraft, railroad locomotives, and motor vehicles. Not all these applications were yet feasible, but the panel urged that the federal government provide generous support for basic and applied research in university, industrial, and federal laboratories. Recognizing the many potential applications of nuclear technology, the panel concluded, however, that "atomic power may be the most tangible symbol of America's will to peace through the peaceful atom. . . . If we fail to act to bring atomic power to the free world, other countries will do so ahead of us, or progress will proceed at a slower pace."

NEW DATA ON FALLOUT

By the end of 1955 the Commission's laboratories and headquarters staff were beginning to publish a substantial amount of data on radioactive fallout from nuclear testing. The Commission's *Nineteenth Semiannual Report*

to the Congress in January 1956 contained a fifteen-page summary of recent findings on the long-term effects of fallout and brief descriptions of research sponsored by the Commission on radiation effects. More authoritative and detailed was a paper published in a scientific journal by Gordon M. Dunning, a health physicist in the division of biology and medicine. Dunning presented data on the blast, thermal, and radiation effects of nuclear detonating and discussed the radiation hazards posed by internal emitters such as strontium-90 and iodine-131. He concluded that the hazards of testing were negligible up to that time.⁴

Of much greater public interest was a paper that Libby presented at Northwestern University in January 1956 on "Radioactive Fallout and Radioactive Strontium." Libby's lecture was especially valuable to those outside the atomic energy establishment because for the first time it openly presented data gathered in Project *Sunshine*. In fact, Libby explained the background of the project and described the worldwide sampling network that had been created to gather data on fallout patterns for strontium-90. Libby contended that the major part of bomb debris from high-yield tests reached the stratosphere, where it would be suspended for about a decade before it slowly descended to earth. Because strontium-90 has a relatively long half-life—twenty-eight years—most test debris, Libby admitted, would eventually enter the earth's biosphere, where it could reach the food chain and potentially endanger children through cow's milk.

Libby reported a recent estimate that the maximum permissible concentration of strontium-90 in the human body was about one microcurie per 1,000 grams of calcium.⁵ To help calculate total body burden, scientists had devised a convenient measure called a *Sunshine* unit, which was 0.001 of the permissible adult body burden. Thus, ten *Sunshine* units were comparable to natural background radiation. One thousand *Sunshine* units were not expected to produce any visible skeletal damage, but ten thousand units might be hazardous. Children under seven years of age were most susceptible to strontium-90, but absorption among adults over forty was negligible. Measurements made in Houston, Texas, on bones of deceased children indicated an average strontium-90 content of 0.4 to 0.6 *Sunshine* units.⁶

Libby sought to reassure his audience that the hazard from testing, if continued at the prevailing rate, would be insignificant. Despite the problems with the *Castle-Bravo* shot, Libby insisted that the weapon tests were conducted with great attention to the dangers of local fallout. In addition, scientists in Project *Sunshine*, who had collected fallout from gummed papers, milk and cheese, alfalfa, animal meat and bones, and even human cadavers, projected that worldwide fallout would be dispersed rather evenly, with slight concentration in the middle latitudes, principally by rains, morning mists, and fogs. Most fallout was dumped into the seas, drained into rivers and lakes, or washed into the top two or three inches of soil where it was held "very tenaciously." According to Libby's calcula-

tions, even if all the bomb debris distributed uniformly around the world were to reach the biosphere, there would be little risk to human beings. As it was, only a small fraction of the strontium-90 accumulated in human bones. "On the basis of the information [we have] obtained," Libby declared, "it is possible to say unequivocally that nuclear weapons tests carried out at the present time do not constitute a health hazard to the human population."⁷

Libby's "unequivocable" confidence in the safety of nuclear testing was not universally shared, however, even by the other Commissioners. Murray, for one, questioned the accuracy of some of Libby's information and openly challenged the wisdom of taking such a positive position in the Commission's semiannual report. Ultimately, the Commissioners adopted a much less categorical statement, noting in the section on "Long Term Effects of Fall-out From Nuclear Weapons" that the subject was "necessarily one in which the conclusions may vary over a wide range." The report conceded that estimates of injury from strontium-90 were based on data extrapolated from the known effects of radium on the human skeleton. Because injury due to strontium-90 had never been observed, there remained "degrees of uncertainty" over what concentration might actually produce damage.⁸

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FALLOUT AND THE HAZARDS OF TESTING

Health effects from fallout were not the only "degrees of uncertainty" that plagued the Commission in January 1956. The general advisory committee learned from Charles L. Dunham, the new director of the Commission's division of biology and medicine, that only 3 percent of the estimated debris from the *Castle* tests could be accounted for worldwide. The Commission estimated that 90 percent of the *Castle* fallout had dropped into the ocean, leaving only 10 percent for stratospheric deposition. The British, on the other hand, estimated that 60 percent of the strontium-90 produced from megaton explosions remained in the stratosphere. Furthermore, British figures were six to ten times greater than the American estimate if the concentration in temperate regions with high rainfall were considered. If the British calculations were correct, according to Dunham, maximum permissible body burden would be reached after exploding 110 to 170 megatons of fission weapons, rather than the American estimate of 11,000 to 17,000 megatons. Finally, Dunham concluded that health standards had been set for adults, but that effects on babies and children were not "known with equal certainty."⁹

Libby repeated his Northwestern University speech almost verbatim before a House subcommittee on government operations, which was receiving testimony on "Civil Defense for National Survival." Questioned closely

by Congressman Holifield, Libby repeated his unequivocal assurances that nuclear weapon testing was safe. Later, when the Commission discussed the December 1955 program status report to be sent to the Joint Committee, Murray again suggested adding a qualifying introductory paragraph to the section on fallout to the effect that the information represented the best, but not necessarily the definitive, estimates of the staff. This time the Commission rejected Murray's amendment by a three-to-one vote.¹⁰ For the time being Libby's public analysis of the global fallout hazard from testing went essentially unchallenged.

When Ralph Lapp testified before Holifield's subcommittee, he complimented Libby for his impressive statement. In fact, Lapp used Libby's data to estimate the strontium-90 hazard of local fallout. Urging the Commission to publish the actual measurements on Rongelap, Lapp postulated that local hazards from strontium-90 could be serious. He observed that the persistence of radiation effects were subtle and insidious. Madame Joliot-Curie had recently died of leukemia, and earlier her mother, Marie Curie, had succumbed to radiation effects. Lapp, nevertheless, was more concerned about the dangers of nuclear warfare than he was about the hazards of testing.¹¹

As Lapp's testimony clearly indicated, the Commission was walking a fine line between justifying continued testing and informing the American people of the dangers of radioactive fallout in nuclear warfare. To counter increasing public opposition to further weapon tests, Libby proposed writing an unclassified technical paper on radiostrontium fallout that would outline the scientific data compiled by Project *Sunshine*. The Commission could not indefinitely argue that testing was safe, Libby stated, without declassifying the statistics upon which its conclusions were based. The general advisory committee agreed with Libby and recommended that "the flow of such information to the public domain be accelerated."¹² Such openness, Libby reminded the Commissioners, "has brought us the freedom to proceed with *Redwing*," the Pacific test series that included the first dropping of a hydrogen bomb from an airplane. Release of the *Sunshine* data, however, would also permit foreign governments to infer that American tests had yielded fission debris from at least twenty-four megatons of detonations. In the interests of the testing program, the Commission decided that neither American security nor the common defense would be jeopardized by releasing the *Sunshine* data through Libby's April 20 address to the American Philosophical Society in Philadelphia.¹³

DULLES'S ASSESSMENT OF NUCLEAR ARMS

John Foster Dulles was becoming increasingly alarmed in January 1956 by what he described to Eisenhower as trends unfavorable to the United States

in the development of nuclear weapons. The Soviet Union was already achieving the capacity to devastate the United States by surprise attack. In a few years, Dulles predicted, the Russians in a single stroke could virtually obliterate America's industrial power and seriously impair the nation's capacity to retaliate. Thus, the United States' own nuclear deterrent would be weakened. Conversely, Dulles also worried that the strategy of "massive retaliation" itself was becoming obsolete as the United States' ability to wage devastating nuclear warfare increased. He speculated that reluctance to use powerful nuclear weapons might begin to depreciate the value of the United States as an ally, undermine Western confidence in "collective defense," and reduce the availability of foreign bases to American forces.¹⁴

332 Most serious, Dulles acknowledged that nuclear weapon stockpiles were expanding at such a pace as to endanger human life on earth or at least vast segments of it. He told the President that the world cried out for statesmanship that would command nuclear power to serve humanity, not destroy it. Furthermore, Dulles thought that most people looked to the United States with its spiritual power, intellectual resourcefulness, and dedication to peace to lead the way to the peaceful atom. Dulles also believed that Eisenhower, who had inspired great hope with his Atoms-for-Peace and Open Skies proposals, was uniquely qualified to assume international leadership. The trouble was that both ideas had largely lost their popular influence because Atoms for Peace, for all of its promise, would not halt the nuclear arms race. Moreover, neither Open Skies nor any other inspection proposal had been linked to any broad American plan for nuclear disarmament. Thus, the Soviet Union, with its "ban the bomb" propaganda, had been able to challenge America's moral leadership by claiming that they wanted to end the thermonuclear danger. But the Americans were widely perceived as stalling on nuclear disarmament while trying to think up good reasons for continuing the nuclear race, or even expanding it. The irony for Dulles was that the communists, "whose creed denies moral principles," might subvert America's moral leadership.

Given the Soviet Union's unreliability and the lack of international controls and organization, the United States, in Dulles's view, had no alternative but to maintain an arsenal of nuclear weapons. Dulles saw virtually no possibility of finding a technical solution to the disarmament problem, and there was almost no chance that the Russians would submit to the comprehensive inspection system that the United States would demand before agreeing to substantial disarmament. Indeed, slim hopes vanished when Americans would not state categorically in advance that, should inspections prove technically feasible, the United States would, in fact, drastically reduce nuclear arms. Dulles concluded that the major obstacles to nuclear disarmament were not technical but political. To that end, Dulles hoped to expand the United Nations' peacekeeping role by outlawing national stockpiles of atomic weapons and providing the United Nations Se-

curity Council with sufficient atomic weapons to counterbalance any threat of nuclear attack by a single nation. Probably inspired by Stassen, Dulles's observations were still vague and speculative. Nevertheless, he shared them with Eisenhower, who apparently welcomed even the rough ideas of Dulles.

Eisenhower agreed with his Secretary of State that it was essential for the United States to recapture the political initiative in the debate over nuclear disarmament, although the President was not quite so willing to give up the search for technical solutions. Rather, Eisenhower suspected that political and technical proposals would have to complement each other. Certainly, technically feasible inspection schemes would strengthen any politically acceptable disarmament treaty. As anxious as Dulles was to counter Soviet propaganda, Eisenhower ignored the suggestion that disarmament might be enforced through the United Nations.¹⁵

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A NEW REJECTION OF DISARMAMENT

Despite rebuffs during 1955, Harold Stassen continued to develop a comprehensive American policy on arms control and disarmament. Sharing some of his views with Senator Hubert H. Humphrey's disarmament subcommittee on January 25, 1956, Stassen described testing as a necessary consequence of the arms race. As long as the Cold War continued, weapon testing would be "essential" for national security.¹⁶ Although satisfied with Stassen's defense of testing, the Commission did not share his long-range hope that all nuclear material could be restricted to peaceful purposes. Not only would it be almost impossible to implement such a proposal, but, as Commissioner Harold S. Vance observed, Stassen's goal might also preclude developing military propulsion reactors for ships or other vehicles. In addition, Strauss pointed out that large amounts of nuclear materials would be needed for purely defensive uses in anti-aircraft missiles.¹⁷ When the National Security Council met the following day, January 26, it took no action on Stassen's report.¹⁸

BRITISH MOVE TOWARD A TEST BAN

Testing became a major item of discussion when British Prime Minister Anthony Eden visited Washington in February. Eden asked whether, as a move in the Cold War, the United States and the United Kingdom could propose to limit, control, or restrict testing. He frankly admitted that the idea would help him politically in the United Kingdom where apprehension over fallout was mounting. Eden also believed that there was little chance that the Russians would agree to control testing.

Strauss did not like Eden's suggestion. He lectured Eden that all nuclear testing to date had added to the environment only a very small fraction of the radiation generated by natural sources; the differences, Strauss claimed, were no greater than the increases in exposure encountered in going from sea level to 5,000 feet. Furthermore, thermonuclear technology did not require the testing of ever larger bombs but rather the development of more efficient, lighter weapons such as those used against aircraft.¹⁹

When Strauss estimated that the National Academy of Sciences would require at least two years to complete all of its fallout study, Eden complained that lack of concrete conclusions in preliminary reports would probably increase pressures in the United Kingdom to stop testing. At a minimum, Eden wanted to reassure the British public that the United Kingdom and the United States were jointly studying the matter. Strauss reminded Eden that the two countries were cooperating in the study of radiation effects and promised to send the Prime Minister Libby's recent speeches on fallout and other pertinent information planned for release.

According to Dulles, there were two possible reasons for limiting testing: first to protect health, and second to advance arms control. Dulles reassured the British that the United States would stop testing if it were proven dangerous to humanity. Nevertheless, announcing that the United States and the United Kingdom were discussing a test limitation would only give credence to the belief that testing was hazardous. In Dulles's opinion, a joint study could not conclude that testing was safe without producing "a very bad public reaction." On the other hand, Dulles doubted that there would be serious technical difficulties in devising a workable test limitation if humanity was actually being injured by testing.

Dulles believed that any plan to limit testing as a first step toward arms control presented an entirely different set of problems. Unless testing were banned entirely, Dulles predicted great difficulty in distinguishing between permissible and nonpermissible tests and in establishing effective controls. The *Castle-Bravo* shot in 1954 had dramatically illustrated the difficulty in estimating yields. A cheating nation, Dulles speculated, could merely claim that a nonpermissible test had been the result of an unintended large yield. Cheating could also occur in China or Tibet where responsibility for the tests would not be clear. As a step toward arms limitation, Dulles vigorously concluded, "test limitation would be an extremely fallacious approach."²⁰

THE ARMS RACE: AN "AWFUL PROBLEM"

Following Eden's departure, Eisenhower called an impromptu meeting of the National Security Council to discuss Stassen's proposals. Although

Eisenhower complimented Stassen for his hard work, the President feared that there was nothing really new to propose, except possibly Strauss's idea of designating strips of territory in the United States and Russia where inspection could be tried on a small scale. Strauss also suggested that while earmarking 20,000 kilograms of enriched uranium for domestic use the President should designate an equal amount for peaceful uses around the world.

Eisenhower thought that these suggestions were useful, but he was disappointed at the lack of progress toward disarmament. With elaborate public announcements, radio addresses, messages to Congress, speeches to the United Nations, and high-level negotiations with the Russians, the Administration seemed to be using a sledgehammer to drive a tack. Profoundly discouraged, Eisenhower saw few ways to avoid the gradual drift toward war. Nonetheless, the President felt the moral obligation to seek some alternative to the arms race. He specifically asked the National Security Council to think about "this awful problem" and to offer ideas on how to channel mankind toward peaceful pursuits and the atom into peaceful uses. If the H-bomb could be banned, Eisenhower mused, the world would be better off. He also suspected that defense planning overlooked the fact "that nobody can win a thermonuclear war." In a nuclear war with the Soviet Union, what is left of either country after the first seventy-two hours? the President asked. Eisenhower implored his advisers to search their hearts and minds for some way out of the collision course on which the two nations seemingly were embarked.²¹

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OPEN SKIES: A FADING HOPE

Despite Eisenhower's plea, Stassen and Strauss squabbled over how best to answer Bulganin's letter of September 19, 1955, which had evaluated the President's Geneva proposals. Bulganin had characterized Eisenhower's ideas as "sincere," but he criticized Open Skies because the plan for aerial photography did not include the allies of each country. Furthermore, pushing the standard Soviet position, Bulganin complained that Eisenhower had ignored the reduction of armaments and the prohibition of nuclear weapons.²² To respond to the Soviet's objections, Stassen suggested that the United States pledge its support to the eventual peaceful use of all nuclear material.

Strauss and the Commission objected vehemently to Stassen's proposal. Not only would a pledge to use nuclear material solely for peaceful purposes damage the weapon program, but it would also preclude the development of nuclear propulsion for submarines and surface ships. With Dulles moderating Strauss's strong protest, Eisenhower persisted in expressing his "ultimate hope . . . that all production of fissionable mate-

rials anywhere in the world [would] be devoted exclusively to peaceful purposes."²³

In February 1956 infighting over Eisenhower's nuclear policies must have tried the patience of Administration insiders, who were not even certain whether the President would run for reelection. On February 8, Eisenhower told reporters he would announce his decision before the end of the month. On February 14, the same day that Nikita Khrushchev denounced Joseph Stalin at the twentieth Party Congress, doctors at Walter Reed Army Hospital advised the President that he should be able to lead an active life for another five to ten years. Buoyed by the good news and convinced by his close advisers that no other Republican could be elected in 1956, Eisenhower on February 29 announced his decision to run again for the presidency.²⁴

336 Shortly thereafter, Stassen left Washington for London where the disarmament subcommittee would meet for almost two months, from March 19 to May 4. In London Stassen presented the American modified Open Skies plan, which melded limited aerial inspection with aspects of Bulgarian's ground inspection proposal.²⁵ For Khrushchev, who was also present in London, Eisenhower's obsession with aerial photography was troubling. The Soviet Union did not even have a complete photographic record of its own country, Khrushchev admitted. Whimsically, he claimed that the Russians had little interest in aerial photographs, whether of the United States, Monaco, or Peru. Still, Khrushchev thought the Soviet Union could accept some aspect of Open Skies if the Americans insisted. In addition, he reemphasized that the Russians had dropped their position on banning nuclear weapons because they knew the United States would never agree. Moreover, Khrushchev complained that whenever the Russians had tried to move toward adopting Western proposals over the past years, they had discovered that the West kept moving away.²⁶

THE MORALITY OF MEGATON WEAPONS

Now a persistent goad to the Commission and the Administration, Commissioner Murray renewed his call for a limited test ban on February 23, 1956. Testifying before a closed session of the Joint Committee, Murray recommended that the United States unilaterally cease testing large hydrogen weapons, set an upper limit on the size of thermonuclear bombs to be placed in the stockpile, and intensify development of a wide range of small, tactical weapons. Murray feared that unless the Administration changed its policy, the United States would develop the capacity for destroying the world in a full-scale nuclear war. He had also seen estimates provided to the National Security Council that the Russians might produce a single weapon whose destructive power was greater than the entire American

stockpile. To Murray, the arms race had become sheer madness. No matter what the Russians might develop, Murray was convinced that the United States did not need to experiment with larger, more destructive weapons. Murray was not against testing, whose risks he thought were slight; rather he opposed stockpiling huge numbers of megaton super bombs whose destructive capability might contaminate the entire earth.

Despite the efforts of the Commission's division of biology and medicine, Murray argued that not enough was known about radioactive debris, especially "one of its most insidious components, radiostrontium. . . . Uncertainties about the rate of fallout," he testified, "about variation in world distribution, about the mechanism of take-up into food and into the body, all combine to render definitive answers all but impossible at this moment." One could imagine, Murray warned, "the impact on the medical profession as a whole in this country if it knew the magnitude of our mounting stockpile and the potential hazards associated with its use."

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Murray proposed that the United States unilaterally suspend thermonuclear testing. Conceding that this was his personal opinion, shared by neither the Commission nor the Joint Chiefs of Staff, Murray, for military and moral reasons, also opposed testing and stockpiling megaton hydrogen bombs. From the military perspective Murray contended that megaton-size weapons would not prove useful in warfare.

Atomic superiority does not consist solely in the possession of bombs bigger than those possessed by the enemy. It also rests upon the possession of such a wide variety and range of small atomic weapons that we shall be able to cope successfully with all the various military contingencies that might arise. Superior strength means flexible strength; and this flexibility can only be achieved by advances in the field of small weapons.

Morally, Murray believed that "the traditional canons of justice that govern the waging of warfare are still valid in the nuclear age." Although he was not expansive on his moral arguments to the Joint Committee, Murray, like Eisenhower, saw the interrelationship between atoms for peace and atoms for war, or between nuclear weapons and industrial nuclear power. United States programs in both fields were directed toward the same ends—the furtherance of justice and peace. Virtually elaborating the President's own concerns, Murray identified America's most pressing problem as balancing military and peaceful programs in such a way that each individually and both together served the common purposes. Moreover, Murray believed that as the benefits of nuclear power became universally shared the world would come to appreciate that "God in His almighty power and goodness has given us the secret of atomic energy for purposes of peace and human well-being and not for purposes of war and destruction."²⁷

Not surprisingly, Murray's testimony to the Joint Committee infuriated

ated Strauss. Fearful that the issue might cause the President trouble at his next news conference, Strauss warned White House Press Secretary James Hagerty that Eisenhower might be questioned about testing. Murray knew perfectly well that the tests were not designed for large weapons, Strauss advised Hagerty, but for new applications, particularly in defensive and low-fallout weapons. The Atomic Energy Commission was run like a business, Strauss insisted, which included keeping Murray fully informed of all developments. For some reason, according to the chairman, Murray had a psychopathic obsession about being excluded from vital information.²⁸

338 Strauss's warning was timely and helpful to the President. At his March 21 press conference, Eisenhower was asked to comment on Ralph Lapp's contention that it was possible to construct a suicide weapon so large that it could be carried only by a freighter. Lapp obviously had access to sources similar to Murray's. Although Eisenhower did not answer the question directly, he admitted that there was a practical limit to the size of thermonuclear weapons. There was an old saying, the President continued: "You do not drive a tack with a sledge hammer."²⁹

Suspecting that the President supported his views on the development of tactical weapons, at least in principle, but receiving no satisfaction from the Commission or the Joint Committee, Murray took his case to the public on April 12, 1956, when he testified before Senator Humphrey's disarmament subcommittee. Because in open hearings Murray could not statistically document his arguments that American nuclear firepower and stockpiles were already dangerously high, his moral arguments for unilateral suspension of thermonuclear tests and the development of tactical weapons seemed even more accentuated. Acknowledging the military principle that armaments should be demonstrably useful in actual warfare, Murray described an even higher principle that the use of force is always subject to the dictates of moral conscience. In Murray's opinion the sheer brilliance of America's technical achievements in nuclear weapons had tended to dull the nation's moral sense. As a "nation under God," Murray testified, Americans should recognize their moral obligation to limit war and the use of force. Murray reiterated that he did not think testing as such was dangerous but rather that he was horrified at the ethical implications of Dulles's doctrine of massive retaliation. In retrospect, Murray even confessed that he did not believe that the use of the atomic bomb against "the city of Hiroshima and its multitudes of innocent people could be justified on moral grounds."³⁰

THE H-BOMB: A CAMPAIGN ISSUE

In early spring 1956, Adlai Stevenson, campaigning against Senator Estes Kefauver of Tennessee for the Democratic presidential nomination, spoke

out against continued testing of hydrogen bombs. Inspired by Murray, Stevenson on April 21 proposed to the American Society of Newspaper Editors that halting H-bomb testing would be a dramatic expression of America's real concern for peace. Like Murray, Stevenson would end the tests unilaterally, but, unlike the Commissioner, he did not propose buttressing the tactical stockpile. Stevenson borrowed liberally from Murray's moral arguments while virtually ignoring the fact that Murray had also warned against simplistic "ban-the-bomb" schemes.³¹

Stevenson's proposal, offered to the editors on Saturday, was almost immediately smothered by Russian actions. On Monday morning Nikita Khrushchev informed British businessmen that the Soviet Union was building a ballistic missile with a nuclear warhead. Probably unaware of Khrushchev's announcement in London, Kefauver, uncertain on how best to parry Stevenson, conceded that he "saw no particular good in having further H-bomb tests." Stevenson himself asserted that the Russians had given every indication that they would "go along" with his suggestion. After lunch on April 24, however, Republican Senators Thomas H. Kuchel of California and Styles Bridges of New Hampshire sharply criticized Stevenson's test-ban proposals as misguided. By mid-afternoon, Kefauver had modified his morning statement by insisting that he favored only a reciprocal test ban with the Russians. Stevenson, now sensing that he had committed a major blunder, attempted to counterattack by reaffirming his test-ban proposal while charging that the Administration had been "dangerously dilatory" in developing guided missiles.³²

Intentionally or not, the Russians had struck a major blow at Stevenson's campaign for the presidency without damaging his chances for the Democratic nomination. While campaigning vigorously for Florida's twenty-eight convention votes a week later, Kefauver tried to capitalize on the issue by underscoring the folly of a test ban in the face of Khrushchev's boast. But rather than reaping much benefit, Kefauver only succeeded in emphasizing the extent of Stevenson's political isolation on the question of nuclear armaments. In the long run, Eisenhower was the chief beneficiary of the issue.³³

In his news conference on April 25, Eisenhower emphasized what he described as the paradox in Stevenson's position: that the United States should accelerate the development of guided missiles while stopping research on the hydrogen bomb. In the President's words, "If you don't work on one and get the right kind of explosive to use there, why work on the other?" Agreeing that the paradox simply made no sense, the *Washington Star* thought it analogous to fashioning an artillery piece without bothering to design and produce shells for it. Or, as the *Wall Street Journal* commented, Stevenson could hardly have it both ways. How could America's supposedly weakened defenses be strengthened by hobbling the nation's primary weapons?³⁴

At this point, Stevenson might have escaped with but a few minor bruises. Indeed, with the strongest press support coming from the *Daily Worker*, Stevenson virtually ignored the issue as his campaign for the nomination rolled into high gear during May. But questions concerning testing and the health effects of fallout would not disappear. Without mentioning Stevenson, Ralph Lapp warned that indefinite testing of nuclear weapons would endanger world health. According to Lapp, the Atomic Energy Commission had sugarcoated the bitter facts about fallout and had been guilty of "double-talk with regard to the long-term hazards from nuclear detonations." Lapp praised Libby for publicly airing the issue on April 20 before the American Philosophical Society but sharply disagreed with his conclusions. In fact, the two men agreed only that strontium-90 was the chief long-term threat to human life.³⁵

THE NATIONAL ACADEMY REPORT

On June 12, 1956, the National Academy of Sciences issued its report on "The Biological Effects of Atomic Radiation." Simultaneously, in London the United Kingdom Medical Research Council presented similar findings to Parliament. Indeed, although the two studies had been conducted independently, their release was coordinated for simultaneous publication in the morning papers on the next day.³⁶

According to Libby, neither report presented findings not already known to the Commission and available in open literature. There were minor differences over the effects of strontium-90, no doubt the result of different methods of measuring radioactivity. Libby was also gratified that the reports generally agreed with the Commission's views, with the exception that the studies recommended additional reduction in permissible lifetime exposure to radiation. Libby did not anticipate, however, that the reports would necessitate any change in the Commission's positions on nuclear weapon testing, the Atoms-for-Peace campaign, or any other atomic energy program.

Both reports identified the genetic consequences of radiation as a paramount consideration. Most experts agreed that there was no threshold below which radiation did not threaten genetic damage. Thus, geneticists recommended lowering permissible exposure rates as much as practicable. The National Academy of Sciences now advocated an upper limit of 50 roentgens for individual persons up to age thirty, or an average exposure of the population above natural background not to exceed 10 roentgens from conception to thirty years of age. In addition to natural background, the largest source of radiation to the population came from medical and dental X-rays and fluoroscopy. In comparison to the thirty-year dose to the gonads

that the average person received from natural background (about 4.3 roentgens) and from X-rays and fluoroscopy (about 3 roentgens), the dose from weapon tests, if continued at the existing level, would have been 0.1 roentgen. Even if the test estimate was off by a factor of five—0.02 to 0.5 roentgens over thirty years—fallout from weapon tests was dramatically less dangerous than radiation from medical uses. The academy did not certify that nuclear weapon tests were safe but implied that the risks from testing were minor. The academy did warn, however, that even low levels of radiation could have serious biological effects directly proportional to the amount of radiation. Thus, many of the disastrous consequences of nuclear war could be implied from the lessons of peacetime use.³⁷

The Commission welcomed the academy report and, with the exception of Murray, applauded its conclusions. When the Commission issued its semiannual report to the Congress, Murray refused to concur on the section pertaining to the hazards of fallout from radioactive strontium. The Commissioners concluded that “at the present level of weapons’ testing, the present and potential contribution of strontium-90 to the world ecology is not a significant factor.” The Commissioners thereafter summarized the findings of the academy and affirmed the need for additional research and study, including continuation of Project *Sunshine*. Thus the report became the basis for justifying Commission programs and accelerating research into radiation effects. To the National Security Council the Commission emphasized the need for a broad research program on long-range hazards caused both by nuclear weapon tests and power plants. Again citing the National Academy of Sciences as well as the British Medical Council, the Commission advised the security council that there were still important data to be gathered on the implications of testing and warfare.³⁸

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THE DEMOCRATS AND NUCLEAR POWER

Much to the disappointment of Senator Anderson, the report of the McKinney panel in February 1956 did not give the Democrats ready ammunition to fire at the Commission’s civilian power program, but it did provide a firm base from which to launch an attack. The ammunition was already available in two forms. First, Senator Gore introduced a bill in July 1955 that “authorized and directed” the Commission to construct six demonstration power plants, each of different design and located in a different geographical section of the country. Second, before the Joint Committee on February 23, 1956, Commissioner Murray proposed that the United States install at home and abroad power reactors with a capacity of two million kilowatts. Only in this way did Murray think that the nation could establish “a commanding lead in the atomic power race.”³⁹

By the end of April 1956 Anderson was prepared for a series of hearings on legislation designed to remove the roadblocks that the McKinney panel had found on the highway to civilian nuclear power. As the new executive director of the Joint Committee he had selected James T. Ramey, a veteran Commission attorney, who in a decade at the Chicago operations office had gained an intimate knowledge of both Commission and industry efforts in reactor development. For technical support Anderson had also obtained the temporary services of Walter H. Zinn, who had just resigned after ten years as director of the Commission's Argonne Laboratory. In May Anderson held a seminar and hearings on providing adequate insurance coverage for power reactor owners and equipment manufacturers.⁴⁰

342 The big guns were reserved for hearings starting the following week on the Gore bill and other means of "accelerating the civilian reactor program." To prepare for the public hearings Anderson held two secret executive sessions on May 21 and 22 with officials from the State Department, the Commission, and the Central Intelligence Agency. In the closed sessions Anderson and his colleagues revealed their motivation for supporting the Gore bill. To be sure, the fight over public versus private power, growing distrust of Strauss, and a lack of confidence in industry's professed commitment to nuclear power were all involved. But the center of committee concern was Cold War competition with the Soviet Union. For hours the committee members tabulated and retabulated estimates of future nuclear power capacity in the Soviet Union and to a lesser extent in the United Kingdom and France. In the Cold War context the predictions were alarming. According to "intelligence estimates" the Soviet Union would have 400,000 installed kilowatts by 1958, 1,222,000 in 1959, and more than two million in 1960. In contrast the United States would have 60,000 kilowatts at Shippingport by the end of 1957. If all the power demonstration and independent projects were completed as proposed by industry, the United States would still have only 750,000 kilowatts of capacity by 1960. When it came out that the "intelligence estimates" were based on public statements by Soviet leaders, Strauss contended that these were not serious commitments reflecting Soviet capabilities. To use the Soviet figures to set the American goal might amount to chasing a chimera.⁴¹

In opening the public hearings later that week, Gore dramatized the Soviet threat. To lose that race, Gore said, would be "catastrophic." The United States had "a clear moral responsibility" to develop "this marvelous new source of energy . . . to dispel the Soviet propaganda that we are a Nation of warmongers." But as the hearings continued, the testimony followed the now familiar paths established in 1954 between the proponents of private and government development of nuclear power. Although Anderson, Holifield, and other Democrats supported the Gore bill, it soon became apparent that the proposal was too ambitious. Strauss pointed out that

building six demonstration power plants, each of a different design and in a different geographic location, would be more costly in terms of money and talent than the huge Savannah River project. The idea of scattering reactors around the country also raised in Republicans the specter of a sinister attempt to build regional TVAs across the nation.⁴²

Perhaps Gore had overstated the case for a federally supported nuclear power program, but there was no question that a ground swell of public sentiment was building for some kind of action to get the United States back in the international race for nuclear power. On the Democratic side Robert McKinney took up the issue in a ringing statement before the Overseas Press Club of New York on May 17 and later at the Joint Committee hearings. McKinney charged that the United States had been "backward" in promoting nuclear power, the most advanced, the most dramatic—perhaps even the cheapest—form of foreign aid. The problem, McKinney argued, was that the United States was too concerned about secrecy. "We have been afraid that other nations might misuse the information and the materials we would give them," he continued. But McKinney, who shared neither the Commission's sense of accomplishment nor the State Department's caution, thought risks from nuclear arms proliferation were small, particularly if the United States exported only nuclear power technology while keeping military application under lock and key.⁴³

McKinney's speech seemingly stirred political embers. In reaction, C. D. Jackson, one of the original architects of Eisenhower's Atoms-for-Peace speech who was impatient with the subsequent pace of the program, offered Strauss an embittered history of failure and frustration since the President's glowing proclamation in December 1953. If Jackson's history was too harsh, he was not alone with McKinney in viewing the American program as too timid. Writing for the atoms committee of the Federation of American Scientists, Herbert J. Kouts expressed the opinion that the United States was not moving fast enough. "Probably you are motivated here by a desire to fulfill the program in a straightforward, orderly way, as free from mistakes as possible," Kouts wrote to John A. Hall. "We on the other hand think that some mistakes in detail are allowable, if only greater speed can be bought this way."⁴⁴

Significantly, during spring 1956 the Democrats did not criticize Eisenhower because his nuclear power plan was environmentally reckless or socially dangerous. Rather, following the lead of Anderson and McKinney, they chastened the Administration for not charging ahead far enough or fast enough. In May, hammering away at the Dixon-Yates theme, Senator Kefauver, on the campaign trail for the Democratic presidential nomination, charged that the United States had "fallen woefully behind" the Soviet Union, the United Kingdom, and France because the Eisenhower Administration had insisted that private industry be the exclusive developer of

commercial atomic energy. Kefauver repeated his accusations a month later, more stridently blaming "Republican Freebooters" for falling behind in the international development of nuclear power.⁴⁵

THE GORE-HOLIFIELD BILL

The revised bill that Gore introduced in the Senate on June 29, 1956, reflected a more considerate and temperate position than the original draft. The new version, which Holifield introduced in the House, neither required that the plants be located in six regions nor specified the number or types of reactors to be built. Instead the Commission would be directed to build large-scale plants at existing Commission production sites to provide electricity for those installations, to construct smaller experimental reactors at Commission laboratories, and to assist other nations in developing their own power reactors. With these changes, the Democratic majority easily passed the bill in the Senate on July 12, 1956.⁴⁶

As the election-year session of Congress churned to its end in the last weeks of the month, the House debates loomed as decisive for the Gore-Holifield bill. The Democrats, still firmly in control, used hearings before the House Appropriations Committee as an occasion to denounce both the Commission and the Administration for failing to mount a vigorous government program for developing nuclear power. When the committee submitted its report approving \$440 million to fund reactor construction under the Gore-Holifield bill, it also published the transcript of the appropriation hearings, which contained more than three hundred pages of testimony, much of it excoriating the Commission and supporting the Gore-Holifield plan as a moral imperative. The Administration in the meantime marshaled its forces against the bill while private industry financed an advertising campaign against it.⁴⁷

In seven hours of floor debate on July 24, 1956, the Democratic majority in the House struggled to maintain party ranks in support of the Gore-Holifield bill, but Congressman Cole's success in pushing through amendments favored by the Administration foreshadowed the final outcome. With twenty-seven Democrats not voting and an equal number siding with the Republican opposition, the bill failed by twelve votes.⁴⁸

This unexpected defeat killed all hopes for a nuclear power bill in the Eighty-fourth Congress. Ever since the formation of the McKinney panel sixteen months earlier, Senator Anderson had harbored visions of a well-articulated federal program for nuclear power development that the Democratic members of the Joint Committee might propose as a key plank in the party's platform for the 1956 elections. Now that dream was in shambles. Frustrated by the Administration's refusal to accept any substantial increase in funding for the development of nuclear power, Anderson

became ever more suspicious of Strauss's motives. He even convinced himself that Strauss was really opposed to nuclear power on any basis because it would threaten the economic interests of the Rockefellers, who he believed had vast holdings in fossil energy resources. Bitterly disappointed by the defeat of the Gore-Holifield bill, Anderson angrily withdrew two other bills that he had shepherded through the Joint Committee to encourage private participation in nuclear development: one provided federal liability insurance for nuclear power facilities, and the other amended the Public Utility Holding Company Act to exempt from its provisions power companies participating jointly in noncommercial nuclear projects. Both bills probably would have passed with little or no debate, but Anderson was determined to hold them hostage pending Congressional action on a new version of Gore-Holifield in 1957.⁴⁹

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REDWING AND GENERAL GAVIN

Throughout the spring and into July 1956 the Commission conducted its *Redwing* series of nuclear tests at the Pacific Proving Ground. More than one dozen tests, as described by Strauss, were designed to develop defensive weapons against air and missile attacks.⁵⁰ Nevertheless, *Redwing* also tested America's first airdrop of a multimegaton hydrogen bomb and provided the Commission its best opportunity since the ill-fated *Castle-Bravo* test to collect fallout data in the Pacific. The testing was unaffected by scattered protests in the United States and abroad. On May 21 over Namu Island at Bikini an Air Force bomber dropped its thermonuclear payload, which exploded at about 15,000 feet and created minimal fallout that drifted northward over uninhabited ocean. Somewhat embarrassingly, through navigational error the pilot had missed his target by about four miles, but the miss was of little consequence from either a military, diagnostic, or safety point of view. In multimegaton thermonuclear weaponry, a four-mile error did not mean that the target remained undamaged.⁵¹

A few days after the airdrop General James M. Gavin, Army chief of research and development, used the *Cherokee* shot to illustrate the radiological power and significance of the hydrogen bomb. Under questioning from Senator Stuart Symington, Gavin confirmed that a recent article in *Fortune* was essentially correct: a large-scale thermonuclear attack on the United States would kill or maim some seven million persons and render hundreds of square miles uninhabitable for perhaps a generation. Even more dramatically, Gavin predicted that American retaliation against Russia would spread death from radiation across Asia to Japan and the Philippines. Or if the winds blew the other way, an attack on eastern Russia could eventually kill hundreds of millions of Europeans including, some commentators added, possibly half the population of the British Isles.⁵²

After the Air Force subcommittee of the Senate Committee on Armed Services released Gavin's classified testimony on June 28, 1956, America's allies, the press, and the general public began to understand the startling implications of thermonuclear warfare. The impact on allied nations in Europe, the Middle East, and East Asia could hardly be underestimated as America's partners in Soviet containment and massive retaliation came to realize that they could become devastated victims of a United States-Soviet Union war. Gavin's statement also evoked a sharp protest from General Alfred M. Gruenther, Supreme Allied Commander in Europe, a post once held by the President himself. At the White House, Dulles, Strauss, and others decided that Eisenhower should try to counter the disastrous effects of Gavin's testimony by minimizing the danger of fallout.⁵³

THE "CLEAN" WEAPON

The *Redwing* tests seemed to the President's advisers to offer an ideal opportunity to calm public fears by stressing American efforts to develop weapons with reduced radioactive fallout. The development of "clean bombs" presented the possibility of returning to the pre-*Castle-Bravo* era, when military planning focused on the blast and heat effects of nuclear weapons. There was a real question whether the clock could be turned back, but the White House gave the Commission the task of preparing a press release on clean weapons.

Although Strauss and his colleagues could appreciate the political and diplomatic considerations involved, the Commission was more concerned that any statement at all might compromise military secrets. Edward Teller warned that a reference to clean bombs could provide the Russians significant insight into the design of the United States' most advanced weapons. To reveal that the United States had developed a weapon that had very little fallout would alert the Russians to the fact that the United States had achieved a breakthrough in weapon design.⁵⁴

White House desires to counter Gavin, however, overrode Commission reluctance to declassify some of its work on clean weapons. Strauss explained that a public statement would accomplish two purposes. First, the world would be assured that the United States was not obsessed with weapons of mass destruction. Second, Strauss believed that a press release would reduce public pressure for the cessation of weapon tests. The other Commissioners agreed that testing should be defended, but Libby remained leery of unnecessarily compromising design information. So did Eisenhower, who decided not to issue such an announcement himself because he did not want to field technical questions on nuclear weapons at press conferences.⁵⁵ The President had already mentioned in a press conference on April 25 that the *Redwing* series would test weapons with reduced fallout;

to that extent, American intentions had already been revealed. At an informal meeting when Murray was absent, the Commission acquiesced to an urgent appeal from Dulles that Strauss become the Administration's spokesman on clean weapons.⁵⁶

Strauss issued a brief statement about the results of the *Redwing* tests that same evening. As cryptically as possible, he noted the progress that the laboratories had made in localizing fallout. The tests had achieved "maximum effect in the immediate area of a target with minimum widespread fallout hazard." After assuring the public that large thermonuclear weapons did not necessarily produce massive fallout, Strauss concluded hopefully that *Redwing* had proven "much of importance not only from a military point of view but from a humanitarian aspect."⁵⁷

Unexpectedly, Strauss's "clean bomb statement," as it came to be called, caught a whirlwind. Opponents of nuclear testing might have been expected to dismiss it as the Commission's justification for further testing, but the bitterness of Anderson's and Murray's reactions were surprising. Anderson called the release of the statement without informing the Joint Committee a "studied insult" to Congress.⁵⁸ Murray was outraged because the Commission had approved the statement on July 19, after he had departed for a weekend at home in New York. For Murray, the incident was the latest and among the most egregious efforts by Strauss to grab all power in the chairman's hands. Within the week, Murray appeared before the Joint Committee to repudiate the press release. He did not object so much to what Strauss had said but rather to the fact that he had been hoodwinked into believing the President would make the statement. As it was, Murray had not been given the opportunity to express his views on an official statement by the Commission. Before the hearing ended on July 23, 1956, Anderson, Murray, and Strauss had exchanged bitter words on the issue.⁵⁹

Troubled by the charges and countercharges that undermined the Commission's defense of the testing program, Libby proposed a joint statement acceptable to all the Commissioners. Both Strauss and Murray expressed their willingness to cooperate, but neither man ultimately could overlook the deep personal antagonism that divided them. Before they could reach any agreement at a subsequent Commission meeting, Strauss and Murray fell into bitter name calling: Murray accused Strauss of constantly twisting words, and Strauss blatantly denounced Murray as a liar.⁶⁰ Consequently, the clean bomb statement stood without further official elaboration.

Even had there been clarification, Strauss had already exposed the Commission to scathing criticism from the press. Ralph Lapp wrote a devastating critique in the *Bulletin of the Atomic Scientists*, when he observed that Strauss single-handedly had invented "humanitarian H-bombs." Lapp added a careful review of the available fallout data and a detailed analysis of the probable configuration of the hydrogen bomb. Lapp concluded that

dirtiness was a relative thing. Superbombs could be designed to be relatively clean or very dirty. The former, Lapp assumed, were desirable for test purposes, while the latter could serve as a strategic weapon. "War is a dirty business," Lapp observed. "Part of the madness of our time is that adult men can use a word like humanitarian to describe an H-bomb."⁶¹

STASSEN TRIES AGAIN

The Administration's attempt to exploit the clean weapon theme had backfired, but it did show how seriously Dulles, Strauss, and others took the continuing demand for a moratorium or a permanent ban on testing nuclear weapons. Earlier in June 1956 both men had strongly objected to British plans to open negotiations with the Soviet Union on this subject.⁶² But even more threatening was the test ban proposal that Harold Stassen included in the disarmament plan he sent to the National Security Council on July 29.⁶³

Stassen based his proposals on the assumption that almost any nation, if it so desired, could fabricate an elementary nuclear weapon within three years. Thereafter, he assumed, a nuclear power could build a thermonuclear weapon within another three years. Stassen also foresaw that the United States, the United Kingdom, and the Soviet Union would each have developed intercontinental missiles capable of delivering thermonuclear warheads within three to ten years. Thus, he predicted that in the relatively near future as many as twenty nations, both East and West, would possess nuclear weapons with the potential of igniting world war.⁶⁴

To forestall uncontrolled nuclear proliferation, Stassen offered a complex ten-point plan designed to halt the spread of weapons while promoting peaceful uses. Incorporating key aspects of Eisenhower's Atoms-for-Peace and Open Skies initiatives, Stassen attempted to weave together the main threads of a comprehensive nuclear disarmament policy. The Commission could hardly take seriously Stassen's proposal that a test ban, a reduction of the numbers of nuclear weapons, and a cessation of all production of fissionable materials for weapons be accomplished by July 1, 1957. Stassen even suggested a "reasonable" nuclear posture for the United Kingdom and eventual inclusion of the Chinese communists within the terms of an international arms control agreement.

Whatever hopes Stassen may have had for his disarmament proposal, he had jeopardized his own future by stumbling into the quicksand of Republican politics. In a private meeting with the President on July 20, just before Eisenhower was to leave for Panama to confer with Latin American leaders, Stassen announced his intention to support Christian Herter for the vice-presidential nomination at the forthcoming Republican national convention. According to Stassen, a private poll indicated that with Nixon on the ticket Eisenhower lost six percentage points and jeopardized the

party's chances of recapturing control of Congress. With Herter, Stassen believed the Republicans could attract enough independents and Democrats to achieve Congressional victory.⁶⁵

Apparently, Eisenhower offered no comment on Stassen's startling announcement. Recovering from ileitis and anxious to take off for his delayed trip to Panama, Eisenhower merely assured Stassen that as an American citizen he was free to follow his own judgment. Stassen interpreted the President's vague response as tacit approval of the ill-fated plans to "dump" Nixon from the ticket.⁶⁶ Whatever the President's motives or distractions that day—he was also very much involved in the annual civil defense exercise, Operation *Alert*, which simulated an attack over Alaska—he left Stassen with the impression that the President favored a truly "open convention." Stassen's miscalculations of both the President's intentions and Nixon's strength within the Republican party seriously undermined his role as the President's "Secretary of Peace." In the midst of renewed crisis in the Middle East prompted by Egyptian President Gamal Abdul Nasser's nationalization of the Suez Canal Company, tough budget negotiations with Defense Secretary Wilson, and planning sessions with Republican National Committee Chairman Leonard Hall about the forthcoming convention in San Francisco, Eisenhower was pestered by the "Stassen affair," as the President's personal secretary, Anne Whitman, called it. On July 31 Eisenhower met with Stassen, Ambassador Amos Peaslee, Deputy Special Assistant to the President, and Strauss to discuss progress on disarmament. During the meeting, Eisenhower decided to place Stassen on a month's leave-of-absence so that the disarmament adviser could continue his political activities as a private citizen.⁶⁷

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Inevitably, Stassen's political campaigning for Herter, who actually nominated Nixon in San Francisco, hurt Stassen's standing within the President's inner circle. Meeting with Dulles after the convention, Peaslee pointedly disassociated himself from Stassen's activities. Dulles lamented the unfortunate developments and predicted that they would create a real question of confidence in future disarmament negotiations. Senator William Knowland, a member of the Joint Committee, also confided in Dulles that Congress could no longer have confidence in Stassen's continuing conduct of disarmament affairs.⁶⁸ Nevertheless, despite his pique over Stassen's actions, Eisenhower stood by his "Secretary of Peace" even as opposition to Stassen's June 29 disarmament plan mounted within the Administration.

Despite the concerted efforts of the Administration and the Commission to resolve the pressing questions that the development of nuclear technology had created in domestic and international affairs, little was accomplished during the first six months of 1956. The resolution of nuclear power policy had stalemated with defeat of the Gore-Holifield bill. The President's hopes for halting the slide into the abyss of nuclear war had been thwarted by practical considerations of national security. By pressing too hard and

blundering into political troubles, Stassen had hurt the cause of nuclear disarmament and the test ban more than he had helped it. Six months of opportunity had slid by. Now as Congress disbanded for the national nominating conventions, it seemed certain that nuclear issues would figure prominently in the presidential campaign.

CHAPTER 13

NUCLEAR ISSUES: THE PRESIDENTIAL CAMPAIGN OF 1956

In contrast to their strategy in the 1952 presidential election, Dwight D. Eisenhower and Adlai Stevenson vigorously debated America's nuclear future in 1956. To be sure, as the Oppenheimer case, Dixon-Yates, and the *Lucky Dragon* incident had dramatized, atomic energy was no stranger to the political arena. Yet never before had presidential candidates stressed nuclear issues in a political campaign. In large part, the President himself was responsible for the debate. Throughout his first term Eisenhower had resolutely pressed his Administration to disseminate, within the limits of national security, all available information on atomic energy. Operation *Candor*, the President's 1953 United Nations speech, *Atoms for Peace*, the 1954 Atomic Energy Act, the Geneva peaceful uses conference, annual civil defense exercises, fallout reports, biomedical research and publication, and even the Commission's printed handbook on weapon effects were all part of his effort to inform the American public about atoms for war and peace. Eisenhower would have preferred to keep atomic energy out of partisan politics, and he was annoyed when Stevenson and others tried to capitalize on the test ban and other national security issues. The 1956 presidential campaign, however, reflected Eisenhower's belief that the American people should face up to both the hopes and fears of the nuclear age.

During the presidential campaign in 1956, political skirmishes began over domestic nuclear power, gradually spread to contention over international cooperation, and concluded in a spirited exchange over weapon testing and development. Eisenhower easily won the debates and the election, but not without paying a political price in terms of public confidence in the Atomic Energy Commission, its leadership, and programs.

STRAUSS ON THE OFFENSIVE

The slim margin of the Administration's victory on the Gore-Holifield bill did not deter Strauss for a moment in his drive to develop nuclear power. Privately he considered Senator Anderson's suspicions of his long association with the Rockefellers preposterous, but he hoped that the incident would serve as evidence of Anderson's irrational hostility towards him. Anderson was correct, however, in his conclusion that Strauss was determined to keep the development of nuclear power in the private sector as much as possible. This bias was never more evident than in Strauss's efforts to expedite construction of the Enrico Fermi nuclear plant near Detroit.

352 The Fermi project had grown out of one response to the first invitation under the Commission's power demonstration reactor program. The proposal had come from a group of electric utilities headed by the Detroit Edison Company, whose president, Walker L. Cisler, had long been a spokesman for industry in nuclear power development. Cisler's plan had been to build a full-scale nuclear power plant in marshland on the shores of Lake Erie, thirty miles south of Detroit. The plant was based on the technology produced in operating the experimental breeder reactor, which had first produced electricity from nuclear energy at the Idaho test station in 1951. The breeder concept, which theoretically of all proposed reactor types offered the greatest efficiencies in using uranium fuel, also posed some of the most difficult engineering problems. The experimental plant in Idaho had provided much useful information, but it was far too small to serve as a prototype for the Fermi plant. Furthermore, operation of the Idaho plant had raised some grave questions about the safety of breeder reactors in general. In an experiment in November 1955, scientists at the Idaho station had deliberately subjected the test reactor to a power surge, revealing a short but definite positive temperature coefficient. This term meant that under certain conditions an increase in core temperature produced a rise in reactivity, which could lead to a power runaway and core meltdown. In fact, the core of the experimental reactor had been destroyed in this test.¹

Under the high priority that the Commission accorded the Fermi project as part of the power demonstration program, Reactor Development Division Director W. Kenneth Davis and his staff pushed ahead with the administrative approvals necessary to begin construction of the plant. The core meltdown at Idaho was reason for concern, but the Idaho reactor engineers believed they understood the cause and could correct it. Without disagreeing with this assessment, the Commission's advisory committee on reactor safeguards warned Kenneth E. Fields, the general manager, in June that until much more information was available about the Idaho accident there was no assurance that a similar reaction could not occur in the Fermi plant. Estimates indicated that an equivalent reactivity surge in the Fermi

plant could conceivably result in an explosion that would breach the containment building, and no one knew whether the Idaho failure represented the most serious accident theoretically possible. Before the Fermi reactor could be built with solid assurance of safe operation, the advisory committee concluded that the Commission would have to undertake extensive research, not only on the meltdown mechanism but also on fast-breeder reactors in general.²

This conclusion shocked Strauss and the Commission. Delay of the Fermi project pending additional research might seriously undercut the power demonstration program and give the Joint Committee new ammunition for a large federal reactor program. The same result could come from a Commission decision to put more money into breeder research and development. On the other hand, the Commission could not reasonably ignore the advisory committee's report and grant Cisler's group a construction permit. Under the circumstances the Commission could do no more than issue a conditional permit, pending the completion of additional research needed to assure safe operation of the reactor.

Before the Commission could make a formal decision, Commissioner Murray revealed the conclusions of the advisory committee's report in a hearing before a House appropriations subcommittee on June 29. Outraged that the Commission had withheld the report and then released it to a House subcommittee rather than the Joint Committee, Senator Anderson demanded a copy of the full report. Fearing that release of the report before the Commissioners had made a formal decision on the case would set a dangerous precedent for the Commission's regulatory process, Strauss consulted the staff in an effort to find a way around the Joint Committee's request. After several long discussions, the Commissioners agreed to send the Joint Committee a copy with a request that it be considered "administratively confidential." Anderson refused to accept the report with this condition and informed G. Mennen Williams, the Governor of Michigan, about the situation. When the Commission again balked at releasing the report, Anderson charged that the Commission had used "star chamber" proceedings and suggested that the new Congress in 1957 consider legislation that would separate the Commission's licensing and regulatory functions from its research and production responsibilities.³

Edward Teller had already warned Strauss that the Fermi reactor should not be built until the instability in the Idaho plant had been explained. Strauss also admitted privately that denial of the advisory committee report had been an error, but he had no intention of delaying the Fermi project. The Commission did not reconsider its decision to grant a conditional construction permit, and on August 8 Strauss participated with Cisler in ground-breaking ceremonies near Detroit. Strauss acknowledged that the Commission's action had precipitated "some rather violently voiced opposition in Washington," but he wrote this off simply as an "attack being

directed against the free enterprise development of nuclear power in this country."⁴

Privately Strauss gave some thought to the stance the Administration should take on nuclear power in the impending presidential campaign. At his farm in Virginia he drafted for possible use by Republican members of the Joint Committee a statement denouncing Anderson for destroying the "committee's bipartisan tradition." This, he admitted to a White House aide, was a "labor of love," but on second thought he decided that it would do little more than anger Anderson. The White House agreed. As a campaign strategy Strauss apparently accepted the advice of one of his own staff that "a direct debate on the issue of public versus private power should be avoided, except to point out that the Commission is not doing business . . . exclusively with privately owned utilities."⁵ Because Anderson and the Democrats had already abandoned the nuclear power issue, neither Eisenhower nor Stevenson made any extensive use of it during the campaign.

POLITICS OF THE INTERNATIONAL ATOM

In spring and summer 1956, Atoms for Peace weathered international as well as domestic politics. The Atomic Energy Commission had assumed that in order to foster European political and economic integration, the United States would have to negotiate with the Community of Six on a most-favored-nation basis. That is, while promoting EURATOM partnership among the Six, it would be inconsistent for the United States to execute bilateral cooperation agreements with prospective members of the European Community on terms more favorable than it was willing to give EURATOM itself. For its part, the State Department was well aware of the potential embarrassment and inconsistency inherent in pursuing bilateral arrangements with individual members of the Coal and Steel Community, while at the same time trying to promote a common atomic energy institution among the Six. Bilateral negotiations with the European countries could have been discontinued, but at a price that might have damaged the United States' relations with EURATOM. Belgium's foreign minister, Paul-Henri Spaak, warned that EURATOM's opponents, especially in Germany, were encouraged by America's apparent willingness to undermine European unity by continuing to make bilateral arrangements with European countries. Spaak went so far as to predict "doom" for EURATOM should the United States indicate any willingness to conclude with Germany a power bilateral arrangement under which enriched uranium would be supplied from the President's February 22 allocation. The dilemma was not easy to resolve, particularly in view of the Commission's eagerness to pursue the bilateral route.⁶

Dulles decided it was inappropriate for the United States to refuse to negotiate bilateral agreements with the Six or to declare a moratorium on such negotiations pending the outcome of the EURATOM discussions. But he hoped to deemphasize the bilaterals by not concluding any long-term fuel commitments with the Six (Belgium being a possible exception) until after the future of EURATOM had been decided. Nevertheless, when the EURATOM negotiations bogged down in the summer of 1956, French, Italian, and German interest in discussing separate bilateral agreements with the United States increased to the point where American diplomats feared EURATOM itself was in jeopardy. To the State Department's alarm, at a particularly critical point of the EURATOM discussions between Spaak, Prime Minister Guy Mollet of France, and Chancellor Konrad Adenauer of West Germany, the Commission complicated matters by energetically promoting the bilateral agreements, which only encouraged German and French dissidents.⁷

THE BRUSSELS CONFERENCE

Without seeming to meddle in the internal affairs of Europe, there was little the United States could do overtly to encourage the participants in the Brussels conference, which had convened on June 26, 1956, to study both the Common Market and the EURATOM projects. Jean Monnet, a French statesman and former chairman of the European Coal and Steel Community, had warned Strauss that the United States should not appear to pressure the Europeans into EURATOM with generous offers of enriched uranium. Because EURATOM's formation was primarily a matter for Europeans to decide by themselves, Monnet advised, the United States would do best not to indicate its position in the matter. The trouble with such reticence, however, was that EURATOM opponents had been encouraged by American silence. German industrialists who opposed EURATOM ownership and monopoly over fissionable materials had allied themselves with Franz Josef Strauss, minister of atomic energy affairs, against Adenauer. Led by Minister Strauss, this group advocated creation of an independent German atomic energy program, subject only to loose control by the German Federal Republic, with its international component resting on bilateral relations. The French were also divided between internationalists, led by Monnet, who wanted to check German industrial resurgence through European integration, and those who did not want to sacrifice French advantages in atomic energy to European economic integration. American observers of the debates in the French National Assembly during July 1956 were surprised by the recurring expressions of resentment toward the United States from both the right and the left. Sometimes oblique, but often quite blunt, criticism of the United States was voiced even by moderates favoring

EURATOM who argued that European integration provided France the best opportunity of attaining leadership in developing atomic energy without undignified dependence upon American help.⁸

As enthusiasm for EURATOM diminished following attacks from both German industrialists and French opponents, compromises inevitably weakened the original concept. Despite repeated diplomatic hints that the United States would like to sit down with the prospective EURATOM partners to discuss a strong agreement for cooperation, the Americans were consistently rebuffed by the Six, who assumed that any direct United States involvement in the negotiations would be highly damaging. At the same time, discussions at Brussels produced compromises that threatened to produce a weak and inconsequential European institution, incapable of advancing the United States' main political objective—tying Germany to Western Europe through economic integration. EURATOM supporters were not challenged by a direct assault but rather were undermined by proposals that emphasized cooperation rather than integration. This tactic would have left participating members free to pursue their own course. Left unresolved was the question of whether there could be private ownership of nuclear materials within the community and how the Common Market would be tied to the EURATOM treaty.⁹

THE FRANCO-ITALIAN INITIATIVE

With EURATOM in the doldrums, the French and Italians independently approached the United States to request far-reaching classified bilateral agreements for cooperation: the French proposed an agreement involving 1,000 kilograms of enriched uranium, and the Italians sought an agreement covering 2,500 kilograms. The Franco-Italian maneuver was audacious, and when Dulles learned that the Commission had actually welcomed the overture he severely rebuked Strauss. Invoking Eisenhower's directive of January 11 and noting Ambassador James B. Conant's fear of the disruptive effects of persistent United States bilateral negotiations, Dulles stated unequivocally: "I believe it is incumbent on us to see that we do not take actions which might make more difficult the negotiating problems of the Six Nations." Pending the outcome of the EURATOM talks, Dulles curtly informed Strauss that the United States would suspend bilateral talks.¹⁰

Strauss, angered and no doubt hurt by Dulles's injunction, wanted to take the matter directly to Eisenhower, but instead he confined his reaction to Herbert Hoover, Jr., the Under Secretary of State. Not only did he believe the Administration was backing the wrong program in EURATOM, but he also thought that United States' inconsistencies had become a major impediment to the Atoms-for-Peace program. Strauss observed that the United States had already negotiated three bilateral agreements covering

power reactors with members of the Community of Six, namely, France, the Netherlands, and Belgium. Nevertheless, the Atomic Energy Commission was not authorized by the State Department to discuss power agreements with Italy or Germany, despite their desire to launch atomic energy programs. Meanwhile, the Commission was authorized to negotiate power bilaterals with Sweden, Norway, and Spain. Thus, as Strauss noted with some bitterness, the Commission's role was difficult and confused. It could negotiate rather freely with states in Western Europe outside the Community of Six; but the Commission was enjoined from immediate discussions with Germany and Italy, while at the same time the Commission was collaborating with all other members except Luxembourg. While Strauss professed support for the Administration's larger intentions embodied in EURATOM, he did not believe a discriminatory policy would advance Atoms for Peace in Western Europe.¹¹

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THE SHADOW OF CALDER HALL

After Congress deserted Washington for the campaign hustings in August 1956, Strauss had an opportunity to reassess his position in his continuing contest with the Joint Committee over domestic nuclear power. The defeat of the Gore-Holifield bill gave him breathing space; at the very least it referred the whole question to the new Congress, which a big Eisenhower victory might well make Republican. But no one understood better than Strauss that the ultimate defeat of a government-financed power reactor program might well depend upon whether the accomplishments of private industry made federal support unnecessary.

In autumn 1956 it was by no means clear that a federal program could be avoided. On October 17, Queen Elizabeth II threw the switch sending electricity from the Calder Hall reactors into the national power grid. Anticipating the British achievement, Strauss and the Administration had tried to play down Calder Hall as essentially a plutonium-production facility, which it was, that generated power only as a by-product. But Calder Hall had an enormous impact on the fledgling nuclear industry in many countries, including the United States. Sir Christopher Hinton, director of the British project, announced flatly that "the Calder Hall reactor is giving us the initial lead in the use of nuclear power and we shall be able to retain that advantage for at least a decade by improvements in this type of reactor."¹² American industrial leaders were not quick to argue the point, and Strauss could reasonably expect that the British accomplishment would at the very least rekindle a new demand for federal construction of large dual-purpose reactors in the United States when the new Congress reconvened in January.

To make the British achievement even more impressive, the Ameri-

can entry in the international competition was more than a year from completion. Despite strong pressure from Strauss and the Administration, the Shippingport reactor could never have challenged Calder Hall's completion date. Rickover and his team had already applied extraordinary measures in their efforts to accelerate design and construction, but even in fall 1956 it was already apparent that Rickover would not meet his original target for completion in February 1957. There was only so much that more exhortation and money could do to reverse the effects of labor disputes and delayed deliveries of materials.¹³

NUCLEAR POWER AT HOME AND ABROAD

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Strauss still had high hopes for the power demonstration reactors, but there was cause for worry here, too. The question that Senator Anderson and others had raised about the safety of the proposed Fermi plant had sent a ripple of concern through the Detroit area. In September the United Automobile Workers, the American Federation of Labor, and the Congress of Industrial Organizations filed petitions for intervention and requests for public hearings on the Fermi license application. The experience that Westinghouse had gained on the Shippingport project made it possible for the company to move ahead on the design of the Yankee Atomic plant, but major decisions still remained before construction could start on the power plant at Rowe, Massachusetts. The third project in the first round, the Consumers project in Nebraska, was still struggling to be born. Almost two years after the Commission had authorized contract negotiations, the staff still had not arrived at a funding arrangement that was acceptable to both the public power district and North American Aviation, the design and development contractor. No proposal in the second round had yet been approved, and there was growing doubt within the staff that all of them could ever be accepted.¹⁴

Both Murray and Libby gained some measure of Strauss's determination to keep nuclear power development in the private sector when Commissioner Harold S. Vance raised the issue in a meeting in September 1956. It was perhaps surprising to Strauss that his long-time business acquaintance, a conservative midwestern Republican and industrial leader, should propose that the Commission construct at least two full-scale nuclear power plants to assure that the most promising reactor types were developed quickly. A self-educated engineer who had made his way to the top of the automobile industry to become president of the Studebaker Corporation, Vance had served with Strauss on several corporate boards of directors, and the two men had known each other on a first-name basis since World War II. Strauss had secured Vance's appointment to the Commission just a year earlier to fill Joseph Campbell's vacancy.¹⁵ Vance not

only had credentials acceptable to Strauss and the Administration, but he also seemed to possess personality traits likely to assure that he would not challenge Strauss's leadership. At age sixty-six Vance gave the impression of being a phlegmatic, soft-spoken, and rather colorless business executive.

Vance, however, soon proved himself capable of independent action. On September 13 he told his fellow Commissioners that they could not rely solely on industry to develop nuclear power, especially if the United States expected to win the international race with the United Kingdom and the Soviet Union. Vance believed government projects were necessary to develop some of the more promising and more difficult concepts, such as fluid-fuel reactors. Strauss immediately voiced his concern that, once the Commission opened the door, there would be no way to close it. Industry would thereafter expect the Commission to fund all development costs. Vance did not contradict Strauss directly but rather argued that winning the international race was more important than keeping the government out of nuclear power. This opinion delighted Murray, who at last saw the prospect of gaining support for his views within the Commission. Even Libby confessed some interest in Vance's arguments, particularly if the government were to fund development of pressurized-water reactors, the most promising type. For the first time since Strauss had become chairman, he rather than Murray faced the possibility of being a lonely minority of one on a major policy issue. Neither Vance nor Libby, however, was yet ready to break ranks with Strauss. The Commissioners agreed only to separate the domestic and international aspects of reactor policy and consider both at a later date.¹⁶

Given the delicate balance within the Commission, Strauss laid his plans carefully. As a short-term measure, he spurred the staff to expedite proposals under the power demonstration program. Before the end of September the Commission approved contract terms for two public power projects, Consumers in Nebraska and Piqua in Ohio.¹⁷ This action blunted the charge by the rural cooperatives that the Commission was favoring big private utilities. On the policy issues, however, Strauss would not move until the November elections reliably forecasted the political future.

THE POLITICS OF ATOMS FOR PEACE

During the summer the Democrats geared up for the fall campaign. The Democratic platform, published on August 16, gave full credit to Roosevelt and Truman for initiating the "atomic era" but condemned the Eisenhower Administration for plunging "the previously independent and nonpartisan Atomic Energy Commission into partisan politics." To recapture America's lead in "the world race for nuclear power, international prestige and world

markets," the Democrats pledged not only to accelerate the domestic civilian atomic power program but also "to give reality—life and meaning—to the atoms for peace program. We will substitute deeds for words."¹⁸ Neither C. D. Jackson nor Gerard Smith could have quibbled with this plank.

As vice-presidential candidate, Kefauver kept up his hard-hitting attack on the Atoms-for-Peace program. Describing Strauss as that "baleful figure who is [Eisenhower's] chief atomic energy adviser," Kefauver repeatedly asserted that the President and the chairman of the Commission wanted to keep America's atomic power production in private hands despite the fact that both the British and the Russians had forged ahead of the United States.¹⁹ Consistent with the Democratic platform, Kefauver found no fault with the Atoms-for-Peace program except that the Administration had been too slow, too cautious, and too friendly toward big business.

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Strauss accepted the major role in countering Kefauver's charges. The same October day on which the senator was railing against Strauss in New Hampshire, the chairman defended the Atoms-for-Peace program before the New York Board of Trade. Strauss reiterated the accomplishments of the Geneva conference on peaceful uses and the provisions of the bilateral agreements for cooperation, but he highlighted the progress made toward establishing an international atomic energy agency. Predictably, he rejected Kefauver's sharp dichotomy between public and private power. In Republican terms, the Eisenhower Administration had stripped "the iron jacket of Government monopoly . . . from the atom," returning atomic energy to the people.²⁰

Both the florid rhetoric of the public-private power debate and partisan criticism that the Atoms-for-Peace program lagged behind foreign competitors to a large extent missed the point. All along the President's program had three clearly stated aims: to allocate fissionable materials to peaceful uses in medicine, agriculture, and research; to promote the production of power using atomic fuel; and to divert uranium stockpiles from the nuclear arms race. Under the stewardship of the Commission and the Department of State, the first two goals were successfully, if undramatically, advanced through bilateral agreements by summer 1956. The third objective, closely related to nuclear disarmament, required a significantly different negotiating strategy. Although Atoms for Peace was not a disarmament proposal, the United States, to achieve cooperation with the Soviet Union in establishing nuclear safeguards through an international agency, had to sacrifice both speedy and efficient negotiations. Bernhard G. Bechhoefer, a State Department officer involved in planning Atoms for Peace, later observed that the most successful East-West negotiations following World War II involved patient and confidential discussions with the Russians. Unfortunately, this strategy also subjected the Eisenhower Administration to charges of being too secret and too slow after 1955 when the

Soviet Union joined the discussions relative to the International Atomic Energy Agency.²¹

DISARMAMENT AND THE TEST BAN: INTERNAL DEBATE

While the Democrats ineffectually probed domestic nuclear issues, sharp differences developed within the Eisenhower Administration over Stassen's nuclear disarmament proposals. Predictably, the Commission had responded warily to Stassen's June 29 disarmament plan. Asserting that it did not object to Stassen's intentions but only to his methods, the Commission offered the National Security Council a detailed critique of the disarmament plan as it affected nuclear weapons. To begin with, the Commission did not concur in Stassen's estimates concerning nuclear proliferation. Stassen was driven by the belief that as many as twenty nations might soon be armed with nuclear weapons. In dismissing this estimate as "speculative" the Commission tried to undermine Stassen's main premise.

The Commission objected to any proposal that limited testing and reduced the nuclear weapon stockpile without providing ironclad procedures for inspection and verification. There was unanimous opposition to setting July 1, 1957, as the deadline for halting the production of weapon-grade fissionable material. Not only was inspection an issue, but the date was also too early for the United States to reap full advantage of the weapon improvements tested at *Teapot* and *Redwing*. Even Murray concurred.²²

The Commission was somewhat more conciliatory on testing. With the exception of Murray, the Commission continued to favor a test ban only as part of a general disarmament agreement that included "an effective and proven inspection system." Nevertheless, the Commission also recognized that overriding political considerations made it advisable for the United States government to propose negotiations toward an agreement for limitations on testing. The Commission's concession was stunning, even if Murray's continued advocacy of a unilateral test ban distracted somewhat from the significance of the moment. Still determined to continue the testing program, the Commission was at least willing to discuss limiting the size, number, frequency, and location of weapon tests.²³

Of all the groups that wanted to ban testing, Libby believed by far the most numerous worldwide were those afraid of fallout. "They are just plain scared," Libby observed. Admitting that he did not like the thought of his children collecting strontium-90 in their bones despite his belief that it was essentially harmless, Libby suggested a strategy to limit worldwide fallout from testing. His idea was simple and probably unenforceable: to limit worldwide fallout to ten megatons of test detonations, divided more or less equally among the testing nations. The idea was impractical, but it did

reflect the Commission's awareness that more than rhetoric was required to quiet public fears over fallout.²⁴

Just when the Commission was willing to consider concessions on testing, the Soviet Union unexpectedly launched a major test series. In the past the Commission had not called attention to Russian activities, but after the Soviet Union began testing on August 24 Strauss pointedly contrasted Russian secrecy with the comparative openness of test announcements by the United States. On August 31, Eisenhower noted the second Soviet shot, and on September 3 the Commission reported still a third. Finally, on September 10, the Russians announced their own fourth test.²⁵

Surprisingly, the Soviet's test series did not scuttle the Commission's search for an acceptable formula by which to limit testing. On September 5, the same day that Adlai Stevenson renewed his call for a test ban in a speech to the American Legion, the Commission organized an ad hoc committee chaired by General Alfred D. Starbird, director of military application, to study what might constitute an acceptable limitation on testing. Starbird's committee, which believed the Soviet Union was closing the gap in delivery capability, preferred no test limitation. Besides the inspection problem, the committee predicted that a test ban would have severe impact on morale and recruiting at the national laboratories. Through rigid controls over its scientists, the Soviet Union could maintain its testing capability despite drastic restrictions. Americans, on the other hand, could not expect to retain the best scientists and technicians without an active program. Starbird's group also feared that the Russians might stockpile improved nuclear weapons to be tested on the eve of a general war, too late for the United States to take countermeasures.²⁶

Caution and skepticism aside, Starbird's committee weighed the pros and cons of several alternatives for limiting testing. All involved risk to American security in the committee's view, but the least risky was to "limit" testing to 1955-1956 levels. Should more stringent limitations be necessary, the committee recommended adopting some variation of Libby's plan, perhaps limiting total yield in any two-year period to thirty megatons of atmospheric testing. Such an agreement would still require some verification, and no doubt it would be only one step toward a more comprehensive test ban.²⁷

Determined to find a workable disarmament formula, the President confined his discussions to Dulles, Wilson, Strauss, Radford, Stassen, and his own staff, Sherman Adams, William H. Jackson, and Amos J. Peaslee. With the possible exception of Stassen, Dulles most closely shared Eisenhower's sense of a moral imperative. As cautious as Strauss, Dulles nonetheless viewed the nuclear arms race as an "overwhelming moral issue" that required the United States to give "highest regard to world opinion." Although Dulles did not favor a total test ban, he was convinced that the

United States should "seek agreement on tangible forward steps toward as much as is possible to obtain." In contrast to the Commission, he did not want to defer negotiated agreements "merely for lack of an all-embracing perfect plan."²⁸

Eisenhower's small inner circle of disarmament advisers, not the National Security Council, evaluated Stassen's proposals on September 11, 1956. Both Strauss and Radford now believed that Dulles was leaning towards Stassen's position. With Eisenhower present, Strauss wasted no time in arguing that a reliable inspection system could not be devised by July 1, 1957. Radford went even further, doubting whether an acceptable inspection system could ever be achieved. Against this pessimism, Dulles and Stassen reminded the President that the purpose of the meeting was to discuss whether the Administration should initiate quiet exploratory consultations, beginning with the British, to determine if Stassen's plan might serve as the basis for negotiations. Strauss and Radford, however, could not accept major portions of the proposal. Strauss stressed that the United States should continue to stockpile fissionable material at least through 1958. Production capacity had just reached the point where significant numbers of defensive weapons were being added to the stockpile. Radford concurred, observing that the United States would have to revise its war plans if nuclear stockpiling were halted in the next two years.²⁹

As so often happened, Radford's hardline remarks provoked an impatient response from Eisenhower. If moral arguments were not persuasive, the President was prepared to use economic ones. Citing Secretary of the Treasury Humphrey, Eisenhower argued that some alternative had to be found to the arms race if only to preserve the American economy. From the President's perspective, mounting military expenditures, coupled with the threat of worldwide proliferation of nuclear weapons, represented threats to American security as significant as those from Russia itself.

When the discussion focused on testing, Strauss doubted that the United States could ever stop completely. Even if the United States did not want to develop more powerful or more sophisticated weapons, the Commission would have to guard against deterioration in stockpiled devices, improve control of fallout, and develop related technologies such as safety. When Strauss again objected that July 1, 1957, was an unrealistic deadline, Dulles proposed that December 31, 1957, "or as soon thereafter as an effective inspection system had been installed," would be just as acceptable. Dulles was trying to find some ground for realistic exploratory talks with American allies first, followed by negotiations with the Russians and Chinese.

Although the meeting broke up inconclusively, Eisenhower forcefully restated his determination to escape the disarmament impasse; he hoped to end or limit nuclear tests and to restrict the production of fission-

able material to peaceful purposes. Those measures would calm escalating worldwide fears over fallout and nuclear war, but they could not be accomplished without effective inspection and assurances against surprise attack, both of which were also essential for a durable peace. He advised Radford to continue military planning on the assumption that no agreement would be reached. Eisenhower, however, also endorsed Stassen's proposal in principle, directing that the United States assume "affirmative leadership" toward an agreement. Recalling the seeming hopelessness of an agreement on reunification of Austria, the President still thought that persistence with the Soviet Union might pay off. Before adjournment, he requested that the Departments of State and Defense, the Atomic Energy Commission, and the Joint Chiefs prepare a joint paper, with dissenting views if necessary, for presidential approval by October 15, 1956.³⁰

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Eisenhower's hope for Soviet cooperation received a setback on the very day of the White House disarmament meeting. On September 11, Premier Bulganin rejected the idea of controlling the production of fissionable materials without at the same time outlawing the use of nuclear weapons. The one, Bulganin claimed, was useless without the other. Conversely, Bulganin argued against linking a test ban with a general disarmament agreement as Strauss insisted. In language not unlike that used by Dulles and Stassen, Bulganin described the termination of testing as the "first important step" toward eventual abolition of nuclear arms.³¹

While the President's disarmament advisers labored to meet the October 15 deadline, few outside Eisenhower's inner circle realized the depth of his commitment to end the arms race. Eisenhower believed the matter was too urgent, and delicate, for political bickering. As his sharp tone with Strauss and Radford had indicated, he lost all patience with attempts to exploit the issue for partisan advantage.

THE STEVENSON CHALLENGE

On September 5, running on a Democratic platform that accused the Republicans of plunging "the previously independent and non-partisan Atomic Energy Commission into partisan politics," Stevenson thrust the test-ban issue into the presidential campaign during a foreign policy speech to the American Legion. Attempting to capture something of the peace issue for the Democrats, Stevenson told the Legionnaires that he favored an end to the draft as well as an end to testing megaton hydrogen bombs.³²

Although Eisenhower's contempt was veiled, he did not hesitate to respond vigorously to his own political advantage. In what he called his first major address of the 1956 campaign, Eisenhower flatly rejected the possibility of ending the draft under current world conditions. Nor would

he endorse any "theatrical national gesture" to end testing without reliable inspection. "We cannot salute the future with bold words," the President warned, "while we surrender it with feeble deeds."³³ Eisenhower's speech, however, was largely focused on other matters and revealed that disarmament and the test ban had not yet become major campaign issues.

When Stevenson responded to Eisenhower on September 21 in Silver Spring, Maryland, he elevated the rhetoric only slightly. Like the President, the Democratic candidate also addressed the broad issues of the campaign. Nevertheless, Stevenson gave highest priority to defense questions, including "the incalculable effects of unlimited hydrogen bomb testing." If he were guilty of grandstanding, Stevenson observed, then he was in the good company of Pope Pius XII, Sir Anthony Eden, representatives of the Baptist, Unitarian, Quaker, and Methodist churches, and Commissioner Murray among other sincere and thoughtful people. On the same day Murray issued his own press release denying that he had any partisan motives in raising the question of testing policy; he called for the end of multi-megaton weapon testing and greater effort on smaller weapons.³⁴

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THE PRESIDENT STANDS FIRM

To Eisenhower's distress, neither Stevenson nor Murray would abandon the test-ban question. In Minneapolis on September 29 and in New Jersey a few days later, Stevenson reiterated his proposals and challenged Eisenhower to debate the issues. Murray, in classified correspondence, once again goaded Eisenhower about limiting tests below one hundred kilotons. The President icily referred the letter to the National Security Council without a hint to Murray that Strauss was working on just such a proposal. Eisenhower was willing to allow Vice-President Nixon to counter Stevenson's offensive to a point, but ultimately the President was drawn into the public debate.³⁵

Following his curt reply to Murray, Eisenhower issued a public statement on thermonuclear testing. He expressed regret that the issue had been raised in a matter that could only lead to confusion at home and misunderstanding abroad. Only his closest advisers could fully understand the context of the President's remarks. Ambiguously, he noted that while testing was, and continued to be, an indispensable part of the defense program, the United States had "consistently affirmed and reaffirmed its readiness—indeed its strong will—to restrict and control both the testing and the use of nuclear weapons under specific and supervised international disarmament agreements."³⁶ Only the most astute observer would have detected in the President's words the major shift in Administration disarmament policy.

Stevenson was still unaware that the Administration was preparing a major diplomatic initiative to limit testing. Eisenhower continued his broad defense of the Administration's record, including, but not featuring, comments on his defense record. Even former President Truman, who took great delight in lambasting Nixon, would not join Stevenson in criticizing nuclear tests. Hubert Humphrey, speaking in his role as chairman of the Senate Foreign Relations Subcommittee on Disarmament, urged that the United States "give careful consideration to seeking agreement on banning tests of large nuclear weapons." Humphrey's cautious announcement, however, scarcely helped the Democrats' cause. Stevenson's frustration mounted even as Eisenhower's advisers hammered out the new disarmament proposals. In Seattle on October 9, Stevenson brought the nuclear issue front and center by accusing the Republicans, including the President, of willful political distortion. Taking to heart the fact that Ralph Lapp had endorsed his position, Stevenson boldly attacked Eisenhower's entire nuclear policy and record, even Atoms for Peace. Reminiscent of earlier Democratic criticism, Stevenson tried to contrast the government's weapon program with the Commission's failure to build a single power reactor.³⁷

On October 11, senior representatives from the Commission, State Department, and Defense Department worked toward a compromise on a new disarmament policy. The Commission continued to have reservations about the effectiveness of any inspection system acceptable to the Russians, but on testing it expressed its willingness to move "progressively" to limit nuclear and thermonuclear tests. As yet, the Commission had conceded little while endorsing in principle the idea of limiting testing, no doubt in the belief that any specific agreement would take years to achieve.³⁸

Somehow the press caught wind of the fact that the Administration was entertaining new disarmament proposals. On the same day that his senior advisers were conferring, a reporter asked the President to confirm rumors that the Administration was considering elimination of the draft and halting thermonuclear tests. Eisenhower remarked that the journalist was telling him things about the Administration he had never heard. "I am quite sure no one has . . . suggested to me that we eliminate the draft in my Administration," he continued evasively. Then without even mentioning nuclear testing he declared, "Now, I tell you frankly I have said my last words on these subjects." The President had successfully sidestepped the issue, knowing full well that within four days he expected to receive a coordinated report on the implementation of the Stassen proposals. As a result, Stevenson continued to campaign blindly on the disarmament issue. In San Diego, he blasted Eisenhower for his failure in leadership and lack of new ideas. There could be no "last word" on the hydrogen bomb, Stevenson rebutted, until mankind had been freed from the menace of nuclear incineration.³⁹

GROWING SUPPORT FOR STEVENSON

To be sure, Stevenson did receive some support. Former Secretary of the Air Force Thomas K. Finletter, now chairman of Stevenson's New York state campaign, denied that Stevenson really wanted a unilateral test ban. Finletter, once so critical of Oppenheimer, claimed not to be alarmed by Stevenson's rhetoric; rather he did not see how anyone could object to the Democrat's promotion of arms control and disarmament. In addition, numerous scientists now began to speak out in Stevenson's behalf. In the *Bulletin of the Atomic Scientists*, Bentley Glass, a Johns Hopkins biology professor and member of the National Academy of Sciences' fallout committee, lent credence to Stevenson's fears by warning that carelessness with ionizing radiation could well lead to genetic bankruptcy from which "there might be no recovery, for nation or for mankind." From the California Institute of Technology ten scientists, led by physics professors Thomas Lauritzen and Matthew Sands, called for a "free and open discussion" of Stevenson's proposals. "Time is running out," the California scientists declared, "with an implacability that we ignore at our peril." Nevertheless, a street-corner poll by the *New York Herald Tribune* revealed that voters welcomed the lively discussion but generally sided with President Eisenhower in the debate.⁴⁰

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Encouraged by the public response to his speeches, and anxious to score a major breakthrough in the campaign, Stevenson decided to devote a televised address exclusively to the issues of disarmament, nuclear testing, and presidential leadership. He recruited Clinton Anderson and Stuart Symington to appear with him on the program despite the fact that both senators wanted him to tone down his remarks. Speaking from Chicago on October 15, ironically on the day Eisenhower had set for his disarmament advisers to report, Stevenson denied that his proposals for a thermonuclear test ban had been politically motivated. Still, he thought the issue appropriate for debate during a democratic election. He noted the power of a twenty-megaton bomb—as "if every man, woman, and child on earth were each carrying a 16 pound bundle of dynamite—enough to blow him to smithereens, and then some." He described the danger of fallout from strontium-90—"the most dreadful poison in the world." A mere tablespoonful shared by everyone in the world would produce dangerously high levels of radioactivity in bones, perhaps causing cancer or threatening reproduction. Stevenson added quickly that he did not want "to be an alarmist" or to claim that radioactive levels were too high. He wanted to stop the tests, however, before a maniac like Hitler or other irresponsible regimes fouled the atmosphere with tests of their own. Citing Stassen on the risks of nuclear proliferation, Stevenson then criticized Nixon, his favorite campaign target, for exaggerating the difficulty of establishing safeguards. According to Stevenson, scientists and even the President himself had already

acknowledged that the United States could "detect any large explosion anywhere." Ultimately, he scolded Eisenhower for wanting to shove the hydrogen bomb under the table.⁴¹

With the election less than three weeks away, Stevenson had succeeded in making disarmament and nuclear testing major campaign issues. Unfortunately for the Democratic candidate, the advantage was mostly with President Eisenhower. Stevenson's running mate, Estes Kefauver, almost burlesqued the issue a few days later when he predicted that H-bomb explosions might blow the earth off its axis by sixteen degrees, drastically affecting the seasons. This bit of silliness was immediately refuted by Ralph Lapp, who pointed out that the earth's weight was so great that even millions of tons of exploding TNT would have little effect on the earth's rotation or attitude. Other unnamed scientists interviewed by the *New York Times* called Kefauver's claims "incredible."⁴²

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Kefauver's irresponsible claims aside, Stevenson's proposals on H-bomb testing sparked sharp debate within the scientific community, emphasizing again how tightly the bomb had fused science and politics. Stevenson had enlisted Harold Brown, a geochemist from Cal Tech, to be his campaign adviser on the test ban and disarmament. Arrangements were also quickly made to obtain scientific advice for Kefauver by recruiting David L. Hill, a Los Alamos atomic scientist and former chairman of the Federation of American Scientists, to serve on Kefauver's staff. Henry Smyth, the Commission's lone dissenter in the Oppenheimer case and now a professor of physics at Princeton, also supported Stevenson's call for a test ban. Across the nation scientists signed petitions and letters calling for a test ban or public debate of the issue. As reported in the press, the number of scientists supporting Stevenson grew steadily. In addition to the ten scientists from Cal Tech, five nuclear scientists from Argonne National Laboratory endorsed Stevenson's efforts. In New York, eleven physics professors at Columbia University, where Eisenhower had once been president, took Stevenson's side on the H-bomb issue. Twenty-four scientists at Washington University in St. Louis, thirty-seven faculty members from City College of New York, and sixty-two nuclear scientists from Brookhaven National Laboratory variously subscribed to Stevenson's position.⁴³

THE ADMINISTRATION'S STANCE

The Eisenhower Administration could also enlist prominent scientists to support its position while it continued to assess the effects of nuclear explosions. Early in October, while Stevenson was preparing his test-ban proposals, the Commission again reviewed estimates of the consequences of nuclear warfare. Spurred by General Gavin's testimony in the spring, preliminary studies by the division of biology and medicine confirmed that

strontium-90 presented the greatest fallout hazard after a nuclear attack. In the short run, perhaps 50 percent of the crops might be contaminated and 35 to 60 percent of the unsheltered animals might be killed within the fallout area, with highest mortality closest to ground zero. Necessarily the vague estimates depended upon numerous factors, including bomb yield and weather conditions. The classified studies generally confirmed the National Academy of Sciences' projection concerning genetic mutations. Research conducted in cooperation with the U.S. Weather Bureau could not rule out the possibility that a massive nuclear exchange might usher in a new "ice age" should vast amounts of dust thrown into the stratosphere reduce the amount of solar radiation reaching the earth. Long-term effects, however, were considered negligible when compared with the immediate holocaust that would be unleashed in all-out nuclear war. The Commission's estimates, however, were limited by the fact that it did not have access to war plans and intelligence reports on prospective targets. Consequently, General Starbird recommended that the issue be referred to an interdepartmental group to be convened by the National Security Council.⁴⁴

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Despite the uncertainties of nuclear war, the Commission remained confident that nuclear testing was safe. On October 12, Willard Libby addressed the American Association for the Advancement of Science on "Current Research Findings on Radioactive Fallout." Libby also noted that strontium-90 was the most hazardous of the many radioactive elements found in fallout. But he did not believe that the total amount of radioactive debris in the stratosphere, estimated at twenty-four megatons of fission products, had increased since 1955. The *Redwing* tests, conducted from May into July, had successfully held thermonuclear fallout to a minimum, he reported.⁴⁵

Building on Libby's report, Shields Warren, former director of the Commission's division of biology and medicine, lashed out at Stevenson's campaign. Warren, a prominent authority on medical radiology and scientific director of the Cancer Research Institute of the New England Deaconess Hospital in Boston, telegraphed Strauss that Stevenson's remarks on the dangers of testing needed correcting. Citing Libby's data, Warren asserted that testing could be continued for thirty years at the current rate without creating a significant genetic hazard or raising background levels more than a fraction. On the other hand, he argued, "to permit us to fall behind the Russians is disastrous. To wait for them to catch up to us is stupid."⁴⁶

Strauss and Robert Cutler, the President's national security adviser, assumed the lead in preparing the Administration's counterattack. Strauss urged the general advisory committee to help disabuse the public of Stevenson's inaccurate campaign statements about the "biological effects of radiation, fall-out hazards from test activities, [and the] relative degree of progress in atomic power in Russia, England and the U.S." Without dissent

from the committee, Robert E. Wilson suggested that his fellow members use their speaking engagements to present the correct technical information to the public. Warren C. Johnson, newly elected chairman of the committee, asked Strauss to provide a working list of erroneous and misleading statements. For his part, Cutler arranged for twelve distinguished scientists to meet the President and then to express their indignation over the unwarranted political exploitation of scientific issues.⁴⁷

Ultimately, Eisenhower decided that only he could effectively counter Stevenson's campaign against testing. Perhaps recalling the usefulness of the thermonuclear chronologies that had been prepared by the Joint Committee and the Commission during the Oppenheimer crisis, Eisenhower on October 17 asked Strauss, Charles E. Wilson, and Dulles to draft a "complete history" of the hydrogen bomb, with limits set by security regulations. The history was intended to set the record straight regarding the Administration's commitment to both peace and security. James Haggerty admitted that he did not know whether the paper would become the President's "last words" on the subject. It all depended on the subsequent campaign.⁴⁸

THE INTERNATIONAL AGENCY: BORN AT LAST

As election day neared, delegates from eighty-one nations gathered at United Nations headquarters in New York, to debate the draft statute of the International Atomic Energy Agency. Convened on September 20, the conference was not a rubber stamp, even though most difficult negotiations among the nuclear powers had been completed by the twelve-nation working group during the previous spring. The Russians again unsuccessfully sought agency membership for the Chinese communists and reiterated their insistence that national sovereignty not be sacrificed to the international agency. For the most part, these demands were pro forma. More serious were the reservations on safeguards put forth by the Indians; this discussion occupied more than half the time of the conference.

The draft statute, which satisfied the Commission's minimum standards for safeguards, authorized the agency both to approve the design of any specialized equipment or facility and to require the maintenance of operating records accounting for source and fissionable materials. The agency would also have the right to request progress reports and to have access "to all places, persons, and data" necessary to determine whether diversion of materials had taken place. In the event of noncompliance the agency could suspend or terminate all assistance and withdraw both materials and equipment. To enforce these provisions, the agency was empowered to create a staff of inspectors who would also be responsible for enforcing health and safety measures.⁴⁹

The Indians complained that even these relatively benign provisions might seriously interfere with the economic growth of member states. Specifically, India objected to provisions that included source materials in the accounting system and granted the agency virtually unrestricted rights over weapon-grade reactor by-products. Control over reactor "wastes" was considered essential to prevent stockpiling for weapon development. The eventual compromise involved some sleight-of-hand and judicious rewording of the technical language of the draft statute. In the end the agency retained the accountability for source materials but was limited in its control over reactor by-products so that member states could, under continuing agency safeguards, use by-products material as needed "for research or in reactors, existing or under construction."⁵⁰

With compromise on safeguards accomplished, the conference on October 23 unanimously adopted the statute. Once again the stage was set for a dramatic American gesture. This time, Strauss, appearing on behalf of the President, announced that the United States would make available to the new agency 5,000 kilograms of uranium-235 to be taken from the 20,000 allotted to peaceful uses by Eisenhower in February, provided the agency and the United States could come to agreeable terms. Despite this offer, however, Gerard Smith reported that the American announcement had been received with apathy. Apparently, nations interested in developing nuclear power reactors preferred to work either directly with the United States through bilateral arrangements or through regional groups that might share the enormous costs of the plants.⁵¹

The successful negotiation of the statute just prior to the presidential elections and the numerous bilateral agreements of cooperation, however, did not reveal the main thrust of America's peaceful atomic diplomacy. Officially, the United States continued to support all approaches related to the international development of the peaceful atom—the international agency and bilaterals, as well as the Organization of European Economic Cooperation (OEEC) and other regional associations—but under directions from President Eisenhower, the United States would continue to devote major attention to the reluctant EURATOM group.⁵²

THE BULGANIN LETTER

On October 18, the same day that the President had offered his "last words" on testing, the complexion of the presidential campaign changed dramatically when Soviet Premier Bulganin wrote Eisenhower criticizing the Administration for its political stand on the subject. Bulganin professed understanding and implied forbearance of American electoral polemics, but he could not ignore what he claimed was deliberate distortion of Soviet policy. The Soviet premier was pointedly critical of Dulles, who was ac-

cused of making "direct attacks against the Soviet Union and its peace-loving foreign policy." Following additional polemics of his own, Bulganin renewed his offer of a test ban by endorsing the views of "certain prominent public figures in the United States." As far as the Russians were concerned, Bulganin charged, negotiation of a test ban had failed only because the United States and some of its allies had bargained in bad faith; the Americans, Bulganin charged, renounced their own proposals just when the Russians accepted them.⁵³

Eisenhower was furious. Bulganin's public criticism of Dulles and his transparent support of Stevenson were bad enough, but his clumsy eleventh-hour meddling in American politics was intolerable.

Lewis Strauss was in Battle Creek, Michigan, on October 19 to address a meeting of the Joint United States-Canadian Civil Defense Committee. Dulles called him to arrange a meeting that evening, however late, to discuss the President's response to the Bulganin letter. Dulles, understandably indignant at both the tone and content of the letter, wanted the President to reject the note. Strauss, however, viewed the letter as a major windfall, which, if handled carefully, could be turned to considerable advantage for the President. First, Strauss thought it extremely important that Eisenhower, not the Soviets, release the letter to the public, even if a reply was not ready. By doing so the Administration could regain the propaganda initiative. Second, the reply should vigorously repudiate the Russian's personal attack on the Secretary of State and the shocking attempt of a foreign government to interfere in American domestic affairs. Above all, the letter must be answered, not rejected, because the American public might interpret such a formal diplomatic response as a presidential attempt to duck the issue.⁵⁴

On Sunday morning, October 21, Strauss, Dulles, Milton Eisenhower, Under Secretary of State Hoover, and Hagerty gathered in the President's study on the second floor of the White House living quarters. The President and Dulles accepted Strauss's suggestions, but the hope of releasing the Soviet note in Washington had already been foiled when the Russians published it even before Eisenhower had a reliable translation in hand. Eisenhower used this as a pretext for immediately publishing his own reply. Eisenhower's withering temper, infamous among his inner circle but rarely witnessed in public, was directed squarely at the Soviet premier with little worry about the diplomatic consequence. Eisenhower wrote Bulganin that, were he a diplomat assigned to Washington, he would have been declared *persona non grata* and sent packing back to Moscow. Eisenhower insisted on taking the letter personally because it both attacked the Secretary of State and impugned the President's integrity. Still, Eisenhower expressed his willingness to keep lines of communication open despite the Russian's departure from accepted international practice.⁵⁵

The exchange between Bulganin and Eisenhower was disastrous for

Stevenson, just as Strauss anticipated. The President's white paper on nuclear weapons and disarmament was now hardly needed and contributed little to the remaining campaign or to subsequent diplomatic negotiations. From Chicago, Stevenson attempted to disassociate himself from Bulganin's ploy by denouncing the Russian's interference. Somewhat lamely, Stevenson countered that in reality Bulganin preferred Eisenhower. More to the point, the Democratic candidate declared that the hydrogen bomb remained the real issue in the presidential campaign. Unfortunately, as the *Los Angeles Times* commented, Stevenson had been flanked, with no retreat. It was not, of course, that anyone really believed that Stevenson was a friend of communism or had intentionally played the Russian game. Rather, in the field of nuclear weapons, Eisenhower, former Army chief of staff, commander of the North Atlantic Treaty Organization, and President, obviously held an enormous advantage in both experience and access to information. A special public opinion poll conducted by George Gallup indicated that Americans opposed a nuclear test ban by a two-to-one margin. There is no question that Bulganin's heavy-handedness hurt Stevenson on the test-ban issue. Stevenson did not, as some had feared, derail Eisenhower's determination to seek a nuclear test ban.⁵⁶ Indeed, the presidential campaign, for all the sound and fury, probably did not delay the eventual test moratorium of 1958.

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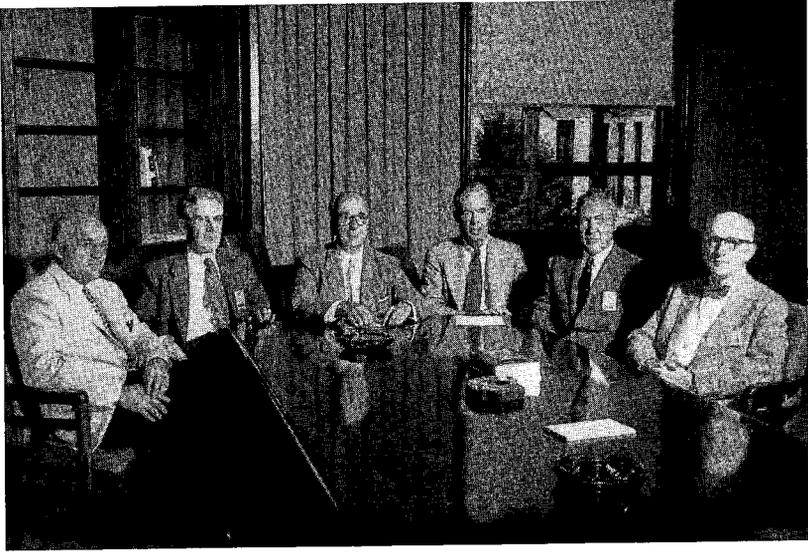
SUEZ, HUNGARY, AND THE NATIONAL ELECTION

The remainder of the presidential campaign was virtually engulfed by foreign developments, greatly to the President's advantage. The Middle East exploded on October 29 when Israel assaulted the Sinai, followed by a combined British and French invasion of Egypt near the Suez Canal. Thereafter, on November 4, Russian soldiers marched into Hungary and ruthlessly trampled the revolution. Two days later on November 6 Americans reelected Eisenhower in a landslide victory that exceeded his 1952 win over Stevenson. Americans seemed both appreciative of Eisenhower for the "peace and prosperity" he had brought to the nation and confident that he would deal firmly with the Russians and other threats to international stability.

NUCLEAR ISSUES IN POLITICS

For the first time atomic energy had become a major issue in a presidential campaign; it was no accident. Since Operation *Candor* and the Atoms-for-Peace speech in 1953, Eisenhower had self-consciously determined to include the American public in atomic energy discussions to the extent na-

tional security permitted. The awesome power of hydrogen weaponry and the great potential of the peaceful atom made it imperative that nuclear energy be a part of the nation's political agenda. Although Stevenson was unable to exploit the nuclear issue, by the same token he was not decisively hurt by his advocacy of a test ban and disarmament. With or without the nuclear debate, Eisenhower, who carried forty-one states with about 58 percent of the vote, would have won reelection handily. The 1956 presidential election, however, provided Americans their first opportunity to vote on political issues involving the future of atomic energy. If not exactly a national referendum on the subject, the election clearly endorsed the atomic energy policies of the Eisenhower Administration.



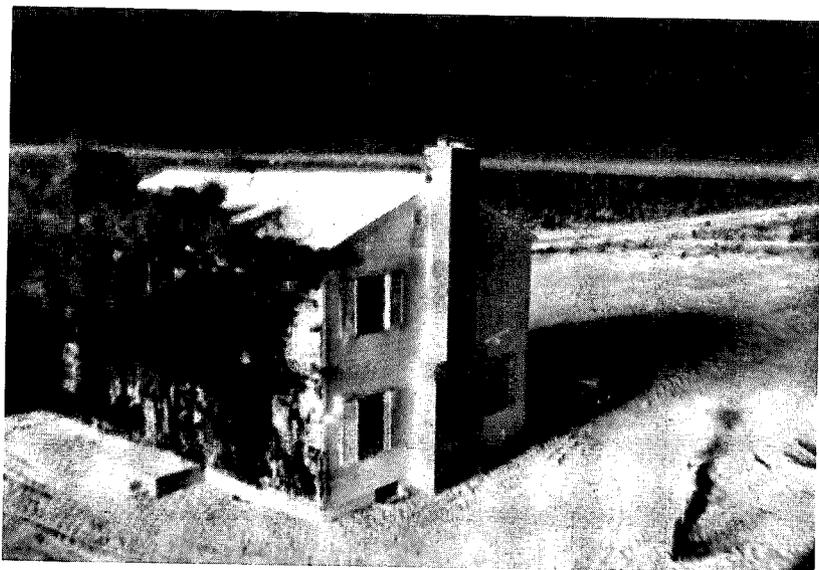
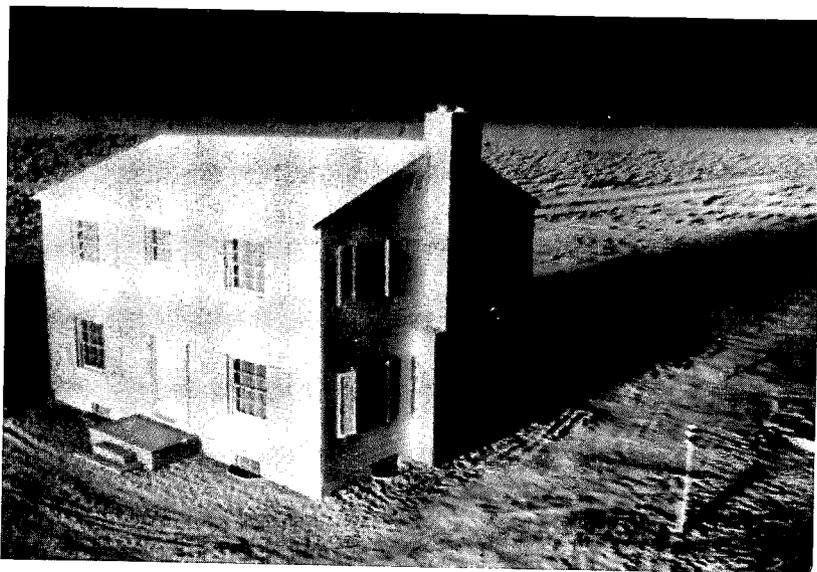
Atomic Energy Commissioners and the general manager at Washington Headquarters, fall 1953. Seated, left to right: Commissioners Eugene M. Zuckert, Henry D. Smyth, Lewis L. Strauss (Chairman), Thomas E. Murray, Joseph Campbell, and General Manager Marion W. Boyer. Photo by Elton Lord.



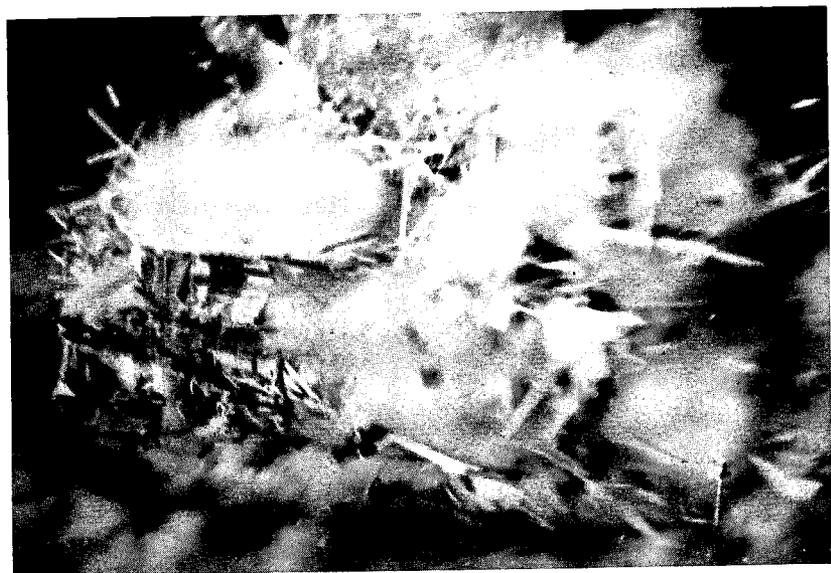
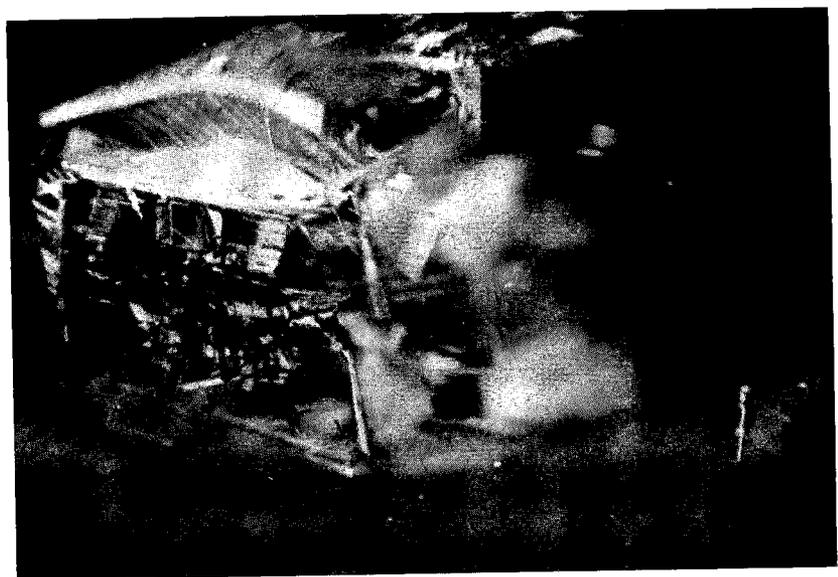
June 2, 1954. Dr. J. Robert Oppenheimer, seated at his desk in his office at the Institute for Advanced Study, Princeton, New Jersey, ponders response to the Gray board decision announced the previous day recommending withdrawal of his security clearance.

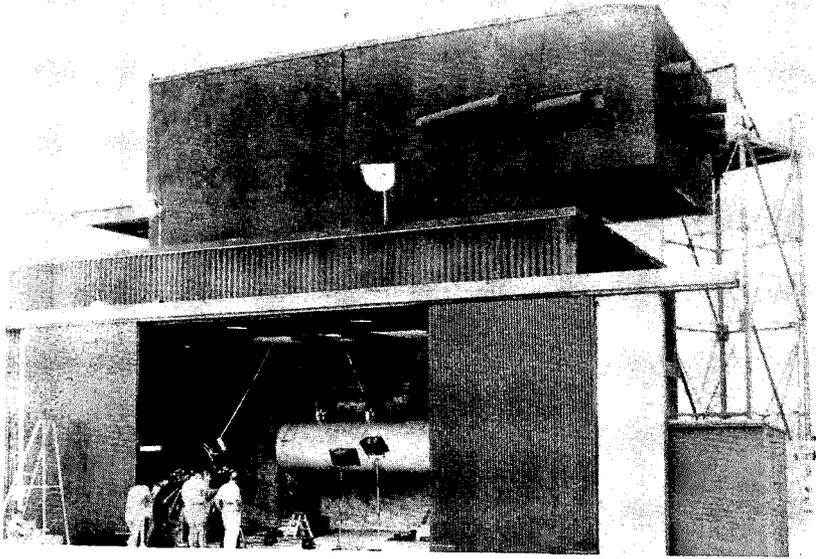


President Dwight D. Eisenhower signs the Atomic Energy Act of 1954 at the White House on August 30, 1954, a major step in opening the way for industrial participation and international cooperation in the peaceful uses of atomic energy. Seated, left to right: Senator William F. Knowland, President Eisenhower, Representative W. Sterling Cole, and AEC Chairman Lewis L. Strauss. Standing, left to right: AEC General Manager K. D. Nichols, Commissioner Henry Smyth, Assistant Secretary of Defense Donald A. Quarles, Military Liaison Committee Chairman Herbert B. Loper, Senator Edwin C. Johnson, Representatives Carl Hinshaw, James E. Van Zandt, Melvin Price, and Carl T. Durham, and Commissioner Thomas E. Murray.



March 17, 1953, civil defense experiment at Yucca Flat. In this series of pictures, the high-speed camera shows the complete destruction of House #1 by atomic blast, 3,500 feet from ground zero.





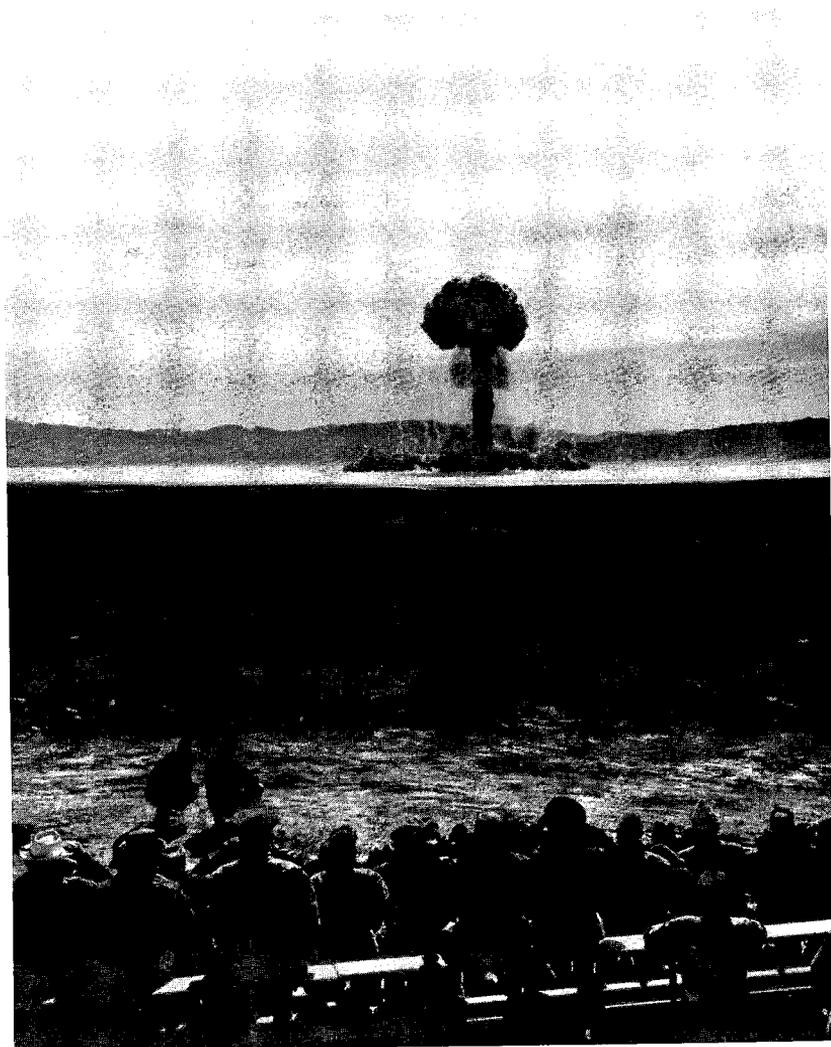
Last minute inspection of the *Castle-Bravo* device located in a small structure on a reef off Namu Island in the central Pacific. The March 1, 1954, detonation of the first shot in the *Castle* series demonstrated the feasibility of a "dry" thermonuclear weapon.



President Eisenhower confers with Administration officials at the White House on January 13, 1956, on the Atoms-for-Peace program. Seated, left to right: Secretary of the Treasury George Humphrey, President Eisenhower, Secretary of State John Foster Dulles, Special Assistant to the President Dillon Anderson, AEC Chairman Lewis L. Strauss, and Secretary of Defense Charles E. Wilson. Photo courtesy Dwight D. Eisenhower Library.



Utility company executives Edgar H. Dixon and Eugene A. Yates break ground in June 1955 for a power plant to supply power for Memphis, Tennessee. The contract between the utilities and the AEC was terminated by President Eisenhower when Memphis officials announced their intention to build a municipal power plant.



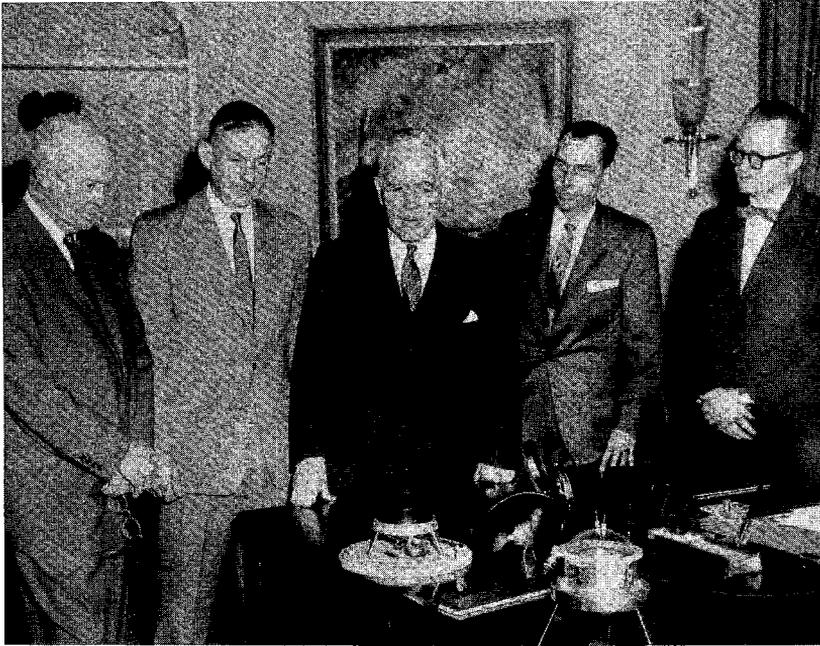
Congressmen and other official observers watch the formation of a mushroom cloud following the firing of an atomic artillery shell from the Army's new 280mm artillery gun. Part of Operation *Upshot-Knothole* test series, the *Grable* shot was fired on May 25, 1953.



AEC Chairman Lewis L. Strauss confers with scientists from Livermore laboratory following June 24, 1957, meeting with the President to discuss "clean" weapons. Left to right: Ernest O. Lawrence, Strauss, Edward Teller, and Mark Mills.



President Eisenhower sets the cornerstone of the new Atomic Energy Commission building located in Germantown, Maryland, twenty-five miles northwest of Washington, D.C. Left to right: AEC Director of Construction and Supply John A. Derry, Representative Carl T. Durham, chairman of the Joint Committee on Atomic Energy, and AEC Chairman Lewis L. Strauss.



AEC Chairman John McCone describes the SNAP-3 device to President Eisenhower as it sits on his desk in the Oval Office of the White House, January 16, 1959. The small lightweight device is a radioisotope-fueled thermoelectric generator for use in space missions. Left to right: President Eisenhower, Major General Donald J. Keirn, assistant director for aircraft reactors (AEC), Chairman McCone, Colonel Jack Armstrong, deputy assistant director for aircraft reactors (AEC), and Lt. Colonel Guveren M. Anderson, project officer, missile projects branch, division of reactor development (AEC).

CHAPTER 14

IN SEARCH OF A NUCLEAR TEST BAN

Although the 1956 presidential election had clearly endorsed Eisenhower's "peaceful" atomic energy policies, the partisan debate over a test ban and disarmament had not clarified these sensitive issues. For the most part, official secrecy still shrouded the military atom so that beyond the President's inner circle few Americans knew of Eisenhower's diplomatic strategy. Only the President's 1953 Atoms-for-Peace speech, his 1955 Open Skies proposal, and periodic reports of the continuing disarmament talks gave any indication of the Administration's intentions.

One historian has speculated that by raising the test-ban issue Stevenson actually may have derailed a decision by the National Security Council to seek a negotiated test-ban agreement with the Soviet Union.¹ There is no evidence, however, that election rhetoric either slowed or deflected the test-ban strategy adopted by the President's disarmament advisers in mid-September 1956. Despite his great impatience with the public posturing of both Stevenson and Bulganin, Eisenhower remained determined to seek an end to the nuclear arms race. If anything, progress toward test-ban negotiations was impeded by internal strife within Republican ranks, not by Democratic campaign criticism. After Nixon's renomination and election as Vice-President, Stassen's position as Eisenhower's special adviser on disarmament became increasingly tenuous. Stassen did not lose the President's confidence immediately, but his open opposition to Nixon's candidacy helped Strauss and others to exploit resistance to Stassen's disarmament plans. Yet even as the President gradually lost confidence in Stassen's judgment, Eisenhower's commitment to a nuclear test ban remained unchanged.

The presidential campaign, however, did promote greater public understanding of radioactive fallout. Although public opinion polls indicated

that Americans generally opposed a nuclear test ban, a survey of the presidents of scientific and technical organizations in the United States indicated that 57 percent of the respondents favored either halting or limiting the testing by all nations. In the October 1956 *Bulletin of the Atomic Scientists*, Ralph Lapp described the Commission, like Macbeth, as "haunted by the ghost of things which will not die." The specter in this instance was radioactive strontium-90, which Lapp reported was turning up in the bones of people all over the world. Using data provided by Libby and others of the Commission, Lapp concluded that some limitation of the test program was urgently needed "to preserve the sanctity of the biosphere."²

In the final days of the campaign, Senator Clinton Anderson charged that the Commission had purposely suppressed an unclassified report on the radiation effects of fallout from hydrogen bomb tests. Anderson's charges were blatantly partisan. Actually he was seeking an advance copy of the chapter on radiation effects of fallout in the *Weapons Effects Handbook*, due to be published early in 1957. Acting General Manager Richard W. Cook explained to Anderson that he could not release the draft chapter because it had not been cleared by either the Commission or the Department of Defense, a cosponsor of the handbook. Anderson insisted that the President order the Commission "to make the true facts public immediately while this important issue is being debated." Having made his point, Anderson later expressed his willingness to settle for the most recent fallout information if the draft of the *Weapons Effects Handbook* were unavailable.³

EISENBUD'S "SUNSHINE SPEECH"

As a result of the political controversy and public debate over fallout, the Commission's general advisory committee, at the insistence of Edward Teller, decided to issue a statement on fallout to be published after the elections. The committee emphasized that radiation effects from tests at no time exceeded those from natural causes, a fact the National Academy of Sciences had already confirmed. Confidently, the committee noted that no "objective" criticism of the academy's report had yet been published. Furthermore, the committee pointed to encouraging progress made during the *Redwing* tests toward developing nuclear weapons with reduced fallout—the "clean bombs."⁴

Thereafter, on November 15, 1956, Merrill Eisenbud, manager of the New York operations office, addressed the Washington Academy of Sciences on worldwide distribution of strontium-90. Eisenbud, in charge of the Commission's radiation monitoring program, acknowledged that strontium-90 was the most hazardous of the nuclides formed in the fission process. Project *Sunshine* had analyzed the physical and biological behavior of strontium-90 as it traveled from the nuclear fireball through the atmo-

sphere into the soil, up through the food chain, and finally via human metabolism into bone.

Using research and sampling techniques slightly different from Libby's, Eisenbud came to the similar conclusion that through 1956 fallout from nuclear testing had not proven hazardous to human health. Libby had estimated that 4 to 10 micromicrocuries of strontium-90 per gram (mmc/g) of calcium could concentrate in bones in persons throughout the United States within ten to fifteen years. Using data gathered on the North Dakota milkshed, where the greatest concentration had occurred, Eisenbud predicted an eventual concentration of 25 mmc/g. Either value was less than the maximum permissible body burden of 100 mmc/g established by the National Committee on Radiation Protection and the International Commission on Radiological Protection. In his summary, Eisenbud noted that over a period of seventy years the highest estimate of skeletal accumulation that could be predicted from the devices already detonated was only 7 percent above the highest estimate received from natural background radiation. The *Sunshine* studies had indicated that the estimate could also be as low as 0.7 percent.⁵ The implication of Eisenbud's speech was clear: testing had created only slightly greater hazards from radioactivity than had mother nature herself.

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The importance that the Commission gave Project *Sunshine* was demonstrated a few days later when the general manager requested an additional \$2 million for the biology and medicine program. Both Libby and Murray observed that Project *Sunshine* ranked next to the weapon program in priority. Libby even suggested that the Commission issue a staff directive stressing the high priority of *Sunshine*. Although not all the additional appropriation would go directly to *Sunshine*, over three-quarters of the funding would directly or indirectly support its activities. Curiously, given the project's high priority and the Commission's responsibility to keep the Joint Committee "fully and currently informed," the Commissioners also decided it was not appropriate to notify the Joint Committee of their action. Concurrently, Gioacchino Failla, chairman of the advisory committee on biology and medicine, called a special meeting, including the Commissioners and the general manager, to evaluate the status and implications of Project *Sunshine* with the hope of developing a public statement. Eisenbud's November 15 speech served as the basis of the advisory committee's discussions.⁶

THE DANGERS OF FALLOUT

When the advisory committee on biology and medicine examined both Eisenbud's and Libby's statistics, a disconcerting conclusion emerged: Eisenbud's and Libby's studies analyzed only past testing, without consid-

ering continued or future testing. Although the committee members had no doubt that radiation levels from testing in the United States and the world were well within safe and established limits, they also noted that additional testing might well exceed permissible limits. H. Bentley Glass, a distinguished geneticist, was the first to observe that if testing continued at the same rate as it had for the past four years, the permissible limits would be exceeded within twenty-eight years; the implication of his simple arithmetic was so startling, however, that even he cautioned that he might "be entirely wrong."⁷

When Murray and Strauss joined the afternoon session, Failla explained the apparent dilemma. The advisory committee remained confident that there was "no appreciable danger" to world population from previous nuclear tests. On the other hand, some members were worried that additional international testing could increase the amount of strontium-90 in the bones of children above acceptable limits within fifteen to twenty years. In short, unless the standards themselves were altered or testing significantly reduced, body burdens of strontium-90 worldwide were likely to rise to levels that were too close to the limits. Murray brushed aside Failla's comments, reminding the advisory committee of the *Plumbbob* tests scheduled for Nevada in spring 1957. Murray had no data that the *Plumbbob* tests would add significantly to the fallout problem. "I would not want anything to happen that would disturb the going ahead with those tests in the spring," he warned the group. "That is our immediate problem, and I don't think anything will interfere with us going ahead."⁸

Strauss was far less categorical and infinitely more diplomatic with the committee members, but he hardly encouraged them to rush to judgment with their findings. When Failla asked how urgent it was for the committee to issue a public statement on worldwide fallout, Strauss replied that a statement was in order "whenever the committee is convinced that it has all the facts." Strauss thought there was no urgency for a statement that could not be supported "by facts in hand." Unfortunately, Failla continued, there would always be speculation, rather than absolute knowledge, concerning the effects of radioactive fallout because most data were obtained from animal experiments instead of human experience. Strauss carefully reminded the scientists that their professional responsibility required them to give the Commission the benefit of their "best judgment, whatever it may be." He then added that as far as he knew, the committee had received no urgent request from the Commission for a public statement. In effect, Strauss reenforced Murray's injunction against issuing a public statement without actually doing so. Not surprisingly, the advisory committee decided not to release a public statement on the hazards of worldwide fallout but instead offered an internal report to the Commission recommending continued studies of the biological effects of low doses of strontium-90. Given the

uncertainties and statistical limitations of the problem, the committee did not expect "to produce definitive results for many years."⁹

Throughout winter and spring 1957 the advisory committee on biology and medicine remained uncertain about how best to advise the Commission, the general advisory committee, and the public on the hazards of radioactive fallout. The general advisory committee was particularly anxious to have a statement it could endorse. Yet, even after two more long sessions on the subject in January and March, no one really knew what the effects of low-level radiation from strontium-90 might be. Failla speculated that there were no thresholds for various radiation effects such as bone tumor or leukemia, but this hypothesis could not be proven. At best, the Commission would have to continue to study the matter in hopes that within a year or two research would yield publishable results.¹⁰

When Senator Richard Neuberger proposed an independent institute responsible for nuclear health and related research and training, the advisory committee opposed the idea on the grounds that it would duplicate the Commission's existing programs and facilities. The committee was fully aware that Neuberger's proposal reflected criticism either that the Commission was not doing its job or that it was improper to combine weapon testing and public health protection in the same agency. Either way, the advisory committee declined comment on Neuberger's bill, confident that the Joint Committee on Atomic Energy would block any action.

Failla, however, was sensitive to the potential conflict of interest between those managing the weapon tests and those responsible for health and safety. When Failla suggested that Eisenhower should appoint an independent committee to advise him on the safety of testing, Strauss noted that it was already too late to review plans for Operation *Plumbbob*. Shields Warren objected to establishing an advisory committee between the President on the one hand and the Department of Defense and the Commission on the other, but he thought that there should be some way "to get word to the Commissioners" that the military's unlimited demands for testing were damaging world opinion. Warren, normally a staunch defender of the Commission, joined those who worried whether all atmospheric tests were militarily necessary.¹¹

In his remarks to the *Sunshine* study group in February, Libby summed up the significance of the Commission's radiation studies. "Next to weapons," Libby stated, "Sunshine is the most important work in the Atomic Energy Commission." Libby believed that, unless the problems surrounding fallout were understood and clearly explained to the public, the testing program might be forced to stop, "which could well be disastrous to the free world."¹² Libby correctly sensed the urgency of the moment, but he missed completely the depth of Eisenhower's commitment to seek an end to testing. For Libby and the members of the advisory committee

on biology and medicine, the most pressing issues were scientific, not moral. But for Eisenhower, the radiation studies, although important, would hardly be decisive in shaping his strategy for controlling the nuclear arms race. Even if *Sunshine* were to prove that atmospheric testing was safe, the President had set his own course to stop testing as an explicit step toward arms control and peace.

STASSEN AND DISARMAMENT

380 In contrast to the fruitless efforts of the Commission's advisory committee on biology and medicine, the President's disarmament advisers gained headway after the national elections. Although the disarmament committee had missed its October 15 deadline, within a fortnight of Eisenhower's reelection Stassen had presented the President a revised version of his June 29 disarmament proposals.

By that time the Soviet Union also adopted new policies which were to pave the way for the 1957 disarmament negotiations. On November 17, Foreign Minister Andre Gromyko informed Eisenhower that the Soviet Union was willing to discuss the possibility of establishing Open Skies over both NATO and Warsaw Pact countries. Thus, although the "Spirit of Geneva" had been shattered by the Hungarian revolution, the Middle-East war, and the acrimonious correspondence between Bulganin and Eisenhower, the great powers were quietly seeking common ground for disarmament discussions.¹³

The pace of disarmament quickened after the American election. Euphemistically, Eisenhower called the three weeks between October 20 and November 8 "Twenty Busy Days." Preoccupied by war and politics, governmental leaders still made progress toward disarmament. On November 21, not yet two weeks since fighting ceased along the Suez Canal, Eisenhower approved Stassen's revision of the disarmament plan, which included a commitment to seek a nuclear test ban. At the United Nations, the Norwegian delegate suggested on November 27 that nations should register all nuclear weapon tests with the United Nations. Registration would not only serve as a first step toward test limitations but would also enable the United Nations to alert member states so that accurate measurements of worldwide fallout could be obtained. Canadian endorsement of the Norwegian proposal suggested that perhaps some limitations on testing could be established. On December 19, Stassen informed the Canadian ambassador that the United States was willing to explore the possibility of registering tests but that the Americans hoped Canada would consult with the United States before formally advocating test limitations.¹⁴

The President's disarmament proposals were officially made public on January 14, 1957, when Ambassador Lodge outlined them before a First

Committee of the United Nations General Assembly. Lodge offered five proposals for the disarmament negotiations scheduled to convene in London in March. The first was to control the production of fissionable material for weapons. Lodge expressed America's hope to reduce weapon stockpiles and to limit the production of fissionable material to peaceful uses under international supervision. If the nations could agree on international controls of fissionable material, then they might be able to limit, and eventually eliminate, all nuclear test explosions. Other proposals included reducing conventional forces and armaments, limiting outer space to peaceful research and exploration, and establishing international safeguards against surprise attack. All proposals, of course, were contingent on establishing acceptable provisions for inspections or verifications. Lodge also indicated the United States' willingness to seek a compromise between Eisenhower's air inspection system and Bulganin's plan for fixed ground observation posts.¹⁵

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In contrast to his dramatic success in drafting the Administration's new disarmament policy with a commitment at least to discuss limiting nuclear testing, Stassen suffered serious political setbacks following the presidential election. His unsuccessful opposition to Nixon's renomination had already raised serious questions about his usefulness to the Eisenhower team. Dulles no doubt surveyed Stassen's liabilities and the Administration's options when he included the "future status of Mr. Stassen" on his agenda of "Matters to be raised with the President" on December 2, 1956.¹⁶

Several weeks later Eisenhower and Stassen had a long and, in the President's words, "brutally frank" talk about Stassen's conduct. Stassen assured Eisenhower of his unconditional support of the President and asserted that his troubles stemmed from the fact that he had been uncompromising in pursuing Eisenhower's disarmament goals, while others had dragged their heels hoping the President would change his mind. There was sufficient truth in Stassen's analysis to reassure Eisenhower of his disarmament adviser's good intentions. In a telephone call to Dulles shortly after his interview with Stassen, Eisenhower expressed confidence that Stassen was not then politically ambitious. Stassen may have made mistakes, Eisenhower confided to Dulles, but not because he was disloyal to the President.¹⁷

Dulles remained unhappy with Stassen's freewheeling style, and he told Stassen that same day that the Secretaries of State and Defense had been given presidential authority for public relations related to disarmament. Increasingly Dulles found Stassen's semi-independent status intolerable.¹⁸

Matters came to a head on January 28, 1957, when Stassen, unable to suppress his antagonism toward Nixon, publicly blamed the Vice-President for the Republicans' Congressional losses in the 1956 elections. Stassen reiterated that if Christian Herter had been Eisenhower's running

mate, the Republicans would have not only regained a majority in Congress but also won more governorships and local elections. Predictably, Stassen's televised interview created a furor within the President's inner circle.¹⁹

382 With the London disarmament talks scheduled to begin in less than two months, Eisenhower had to decide how to deal with Stassen. Obviously, the President did not want to discredit his disarmament adviser on the eve of promising negotiations. Yet he could no longer ignore Stassen's open criticism of the Vice-President. Somehow, he had to find a way to discipline Stassen without destroying his effectiveness at the bargaining table. Eisenhower's solution was brilliant. With Stassen actually involved in United States diplomacy, the President decided that his disarmament adviser could be transferred from the White House to the Department of State. This meant not only that Dulles would now have more control over Stassen but also that Stassen would attend neither Cabinet nor National Security Council meetings unless the agenda specifically included disarmament questions. Thus, Eisenhower saved his disarmament adviser from dismissal, strengthened Dulles's hands in the forthcoming negotiations, and vindicated Nixon without causing any serious political damage.²⁰

The President apparently mollified Stassen as well. Although transferred to the State Department where he ranked below the Under Secretary of State, Stassen was allowed to keep his original title as special adviser to the President. Eisenhower generously urged him gradually to reduce his attendance at Cabinet and National Security Council meetings so that there would be no abrupt or obvious change in Stassen's status. For his part, Dulles encouraged Stassen to attend his staff meetings. Rather pointedly, Dulles stated that he expected "complete loyalty to State Department policies" whether or not Stassen always agreed with them. Although he acquiesced to the changes, Stassen continued to protest that he always tried to be loyal and that reports of his disagreement with Administration policy were completely without basis.²¹

PREPARATIONS FOR LONDON

Although Eisenhower had approved the Administration's new disarmament plan on November 21, 1956, the details had to be hammered out within the government and between the United States and its allies before confrontation with the Soviets in London. The Atomic Energy Commission was uneasy about the President's proposal to limit or eliminate testing contingent upon achieving agreement in other areas of disarmament and establishing an acceptable inspection system. In the meantime, the United States would propose that each nation announce its tests in advance and permit a limited number of international observers to witness the tests. When Stassen asked the Commission to develop recommendations for im-

plementing the President's plan, the Commissioners were able to use the request as a way to contest the proposals without directly opposing the President.²²

The Commission had ample reason for being nervous. Even without an international agreement, the President on the day after Christmas had expressed some doubt about the advisability of authorizing operation *Plumbbob*, a series of twenty-five tests that Strauss had indicated would be conducted in Nevada starting on May 1, 1957. Dulles explained that nearly all the tests would be small and confined to the continental United States. The Secretary of State anticipated no difficulty because recent Soviet tests had provoked little comment.²³

The Commission was not enthusiastic about any testing proposal, and its fundamental position remained unchanged from that expressed to Stassen the previous July. On January 23, 1957, the majority of the Commissioners informed Stassen that they did not believe that the United States should agree to a moratorium on testing independent from a comprehensive disarmament agreement that included inspections and safeguards. They were less adamant about the possibility of placing limitations on testing. An ad hoc disarmament committee appointed to explore various options on limiting testing reported that it was impossible to predict what means might be technically acceptable in the future. Simply limiting the number of tests without at the same time restricting the amount of fallout allowable did not appear practical to the Commission's staff. But, assuming reciprocity from the Russians, the staff anticipated no great problems in admitting observers at the tests, provided they were not permitted to photograph or otherwise record observations that revealed design information.²⁴

The British, too, were wary of the forthcoming disarmament talks. A delegation headed by Ambassador Harold T. Caccia proposed that the two nations adopt a common position in response to any Soviet offer. Thus, as the disarmament conference convened in London, Eisenhower flew to Bermuda for talks with Prime Minister Harold Macmillan, who had succeeded Anthony Eden after the Suez disaster. Nuclear testing was a major item on their agenda, and Eisenhower was inclined to be conciliatory toward Macmillan.²⁵

Gerard Smith, State Department special assistant for atomic energy matters, recommended that the two leaders issue a joint statement reflecting Anglo-American restraint on testing. In their joint statement from Bermuda, Eisenhower and Macmillan affirmed the necessity of continued nuclear testing in the absence of an international disarmament agreement, but they followed Smith's advice by promising to contribute only a small fraction to permissible levels of worldwide fallout. Gratuitously, they assumed the Russians would do the same. Finally, in concert with the proposals Stassen was offering in London, they expressed their willingness to accept the Norwegian plan to register tests with the United Nations and to allow

international observation of the tests if the Soviet Union would do the same.²⁶

LONDON DISARMAMENT CONFERENCE

When the United Nations disarmament subcommittee convened its longest, most significant, and final meeting in London on March 18, 1957, prospects for success were not bright. The Western alliance had been severely tested by the Suez crisis. The French were fighting in Algeria while suffering recurrent crises at home. The British, short of manpower and staggering under their defense budget, had already decided to rely primarily on their nuclear deterrent and had announced that they would be testing and manufacturing a megaton weapon during 1957. The Soviet Union, which had begun a new series of weapon tests in August 1956, exploded six devices in March on the eve of the conference, almost in cynical defiance of the negotiations. For its part, the United States planned to launch the *Plumb-bob* series in May on schedule. All the while, with the Federal Republic of Germany as the new NATO partner, the Western alliance faced decisions on nuclear stockpiles and missile bases in Europe. The pall of the Hungarian revolution still darkened the prospects for peace, and, although Eisenhower was determined to persevere in "waging peace," few outside his inner circle were aware of the depth of the President's commitment.

To complicate matters more, just before departing for the conference, Stassen unaccountably announced that he would be seeking the Republican nomination for governor of Pennsylvania. Although there was no reaction to Stassen's announcement from either the White House or the State Department, the American delegation reportedly anticipated that the disarmament conference would end by late April.²⁷

Within this bleak atmosphere there was reason for optimism on the American side, and for most outsiders it would have seemed to rest with an unlikely personage, none other than John Foster Dulles. Although infamous for having coined the phrase "massive retaliation," Dulles had not initially played a dominant role in shaping Eisenhower's "peaceful atomic diplomacy."²⁸ First, Strauss and then Stassen had that responsibility. Preoccupied by a series of international crises, Dulles had only gradually gained mastery of the moral and technical complexities of nuclear politics on the international level. By spring 1957, with Stassen transferred to the State Department and Strauss isolated by inflexible positions on testing, Dulles, despite his recent bout with cancer, emerged as the President's most dependable disarmament champion. While Stassen and Strauss increasingly voiced the extremes of disarmament and international nuclear policy, Dulles, under the shrewd tutelage of Gerard Smith, kept to the middle road occupied by the President.

Before the London talks opened, Dulles cautioned Stassen to limit his discussions to the proposals that the President and the National Security Council had approved on November 21, 1956. But before the London conference was two weeks old, reports began to filter back to Washington that Stassen appeared to have exceeded his explicit instructions. Alarmed, Gerard Smith confirmed that no one in Washington had cleared what appeared to be new proposals put forward by Stassen. Apparently, after Stassen offered the American proposals, Valerian Zorin, the Soviet representative, called for an "immediate and unconditional halt to tests, without any inspection." Stassen, eager to pursue any opening, did not preclude discussing the Russian's suggestion that a test ban might be the first step toward disarmament, not the last.²⁹

Strauss was angered and alarmed by Stassen's willingness to discuss concessions on the testing issue before an agreement on inspection and verification had been made. He complained bitterly to Dulles, requesting that the Secretary of State call his emissary home for discussions during the Easter recess. Dulles conceded that Stassen was an "elusive fellow" given to overloading the Secretary of State with cables so that he could document that Dulles had been put on notice. Uncertain as to what was happening in London, Dulles agreed to call Stassen back "to find out what is going on."³⁰

Captain John H. Morse, Strauss's special assistant, suspected that Stassen was either confused or intending to confuse. After analyzing disarmament cables from London, Morse concluded that Stassen wanted not only authority to abandon effective inspection, the keystone to the American position, but also personal freedom of action to negotiate the timing and extent of departure from the toughest American demands. Morse confessed, however, that Stassen's purpose, "if it exists, is well disguised—and perhaps accounts for the unusually obtuse wording of the proposal."³¹

STASSEN RECALLED

Stassen returned to Washington under a cloud of suspicion to defend his actions on April 20. There had been an atmosphere of hopelessness in London when he first arrived, Stassen explained, and everyone anticipated short meetings and quick adjournment. Gradually, however, it became apparent that the Russians were interested in the possibility of reaching a "first step agreement." On April 12, Zorin had personally told Stassen that the United States' proposals were receiving serious consideration in Moscow. Three days later, Zorin announced he would return to Moscow during the Easter recess for consultation. Stassen anticipated that when Zorin returned to London the Russians would be amenable to an inspection system that did not undermine their regime either at home or in Eastern Europe. The Soviet envoy had already indicated willingness to negotiate separately

on the major obstacles to a disarmament treaty, including outlawing nuclear weapons and abolishing foreign military bases. In general, Stassen was encouraged that the London conference might yet advance four American objectives outlined by the Secretary of State: (1) limiting the spread of nuclear weapons, (2) reducing the United States' vulnerability to surprise attack, (3) lifting the Iron Curtain slightly, and (4) setting the stage for further negotiations to ease Cold War tensions.³²

Stassen did not believe that a first step toward disarmament involving a limited test ban and cessation of uranium enrichment for nuclear weapons would significantly reduce the nuclear weapon capability of either the United States or the Soviet Union. The greater problem, in Stassen's opinion, would be to get other countries, such as France, to go along. French Foreign Minister Jules Moch had informed him that France would be ready to test its first nuclear weapon by 1959 and, unless some agreement were reached in six months, would pass the point of no return in the development of nuclear arms. Because other nations would be certain to follow, Stassen now supported a twelve-month limited suspension of nuclear tests and production of fissionable materials, a delay that he thought would involve small risk until a reliable inspection system was adopted.

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Strauss, supported by Abbott Washburn of the United States Information Agency, argued that once a test moratorium was established public pressure both at home and abroad against resumption of testing would be tremendous. According to Strauss, a year of testing would be lost just when the United States was on the threshold of developing a relatively clean thermonuclear weapon. Strauss expressed his willingness to negotiate a test limitation, but he adamantly opposed a test ban that would ultimately cripple the Commission's laboratories and permit top scientists and engineers to drift away. The Russians, who Strauss claimed could keep their laboratories at full strength by simple fiat, could break any agreement and end up far ahead of the United States. If tests were limited by number, size, or fallout, however, Strauss believed some agreement might be possible. While Strauss continued to minimize the health dangers related to atmospheric testing, Stassen reminded the group that a major international scientific debate on that very subject was far from settled.

First among Dulles's concerns at the April 20 meeting was the "fourth" or "n-th" country problem. Here Dulles observed, was an important common ground between the United States and the Soviet Union. Both countries were concerned about the implications of nuclear weapons in the hands of "irresponsible" powers, not because they could seriously threaten either the United States or the Soviet Union, but because rash actions might plunge everyone into all-out war. From Dulles's point of view, even if the United States and the Soviet Union failed to achieve substantial disarmament agreement, any successful steps toward eliminating the "fourth" country problem would justify taking some risks.

Following the meeting, Dulles asked to see Stassen privately. Alone, Dulles rebuked Stassen for offering "personal" proposals, which could prove highly dangerous should the Russians accept an idea that the President could not endorse. The Russians had already accused the United States of retreating from positions after the Soviet Union had accepted them. Dulles wanted no possible embarrassment to the Administration, especially since the Senate had not been thoroughly briefed on the progress of the London discussions.³³

Later, Stassen also met with the President before returning to London. Covering much the same ground as he had on April 20, Stassen related his optimism over the Soviet Union's willingness to engage in serious negotiations. Stassen's report was obviously good news to the President, who expressed as much worry over the reactions of officials at State, Defense, and the Commission as he did over the response of America's allies or the Russians themselves. Especially on the testing question, Eisenhower thought that the United States might be the hardest nation to convince on the limitation of tests. Unlike other countries that tested for purely military reasons, Eisenhower observed that American scientists were fascinated by the basic research that the tests made possible—research that often transcended its military significance. Indeed, because peaceful and military research were often so interrelated, Eisenhower speculated that the unlimited right of inspection might be essential to any disarmament agreement.³⁴

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STASSEN'S NEW PROPOSAL

By May 9, 1957, following his return to London, Stassen at Dulles's request prepared a new formulation of the United States' position on arms limitation and control. In a personal telephone call to the President at Gettysburg, Dulles commented that Stassen's new plan was "much too grandiose" and went far beyond anything practical at the time. Nevertheless, Dulles granted the need to revise the American position and recommended calling Stassen back to Washington for another round of interagency discussions.³⁵

Dulles, Stassen, Strauss, Robert Cutler, Secretary of Defense Wilson, and Allen Dulles of the Central Intelligence Agency gathered on May 17 to review, paragraph by paragraph, Stassen's May 9 recommendations. Stassen reported enthusiastically that the Russians were genuinely interested in reaching an agreement and that the leaders of the other Western delegations also hoped for real progress in the negotiations. According to Stassen, during the crises in Suez and Hungary, the Soviets found themselves looking down the "barrel of atomic war." Much to the surprise of both Dulles brothers, Stassen reported that the Russian leaders were not worried about direct conflict with the United States; they believed that even an irresponsible administration in Washington would not attack the Soviet

Union unless the United States was prepared to follow through on land in Europe to finish off the Russians. What the Soviets feared most was that a crisis in Germany, Poland, Europe, or elsewhere might pull them into nuclear war with the United States. Although the Soviets appeared in no hurry to reach an agreement with the United States and its allies, Stassen did not think they were stalling. Rather, the Russians were constantly wondering whether the United States was stalling and whether the Americans were serious.³⁶

388 In order to demonstrate clearly the United States' commitment to arms limitation, Stassen wanted to reformulate the President's November 21, 1956, disarmament policy to strengthen antiproliferation measures, increase international safeguards against surprise attacks, and, not incidentally, open up the Soviet Union and Eastern Europe. For the most part, where Eisenhower's November 21 disarmament policy had provided general guidelines for negotiations, Stassen sought to establish definite strategy and firm language. With respect to Open Skies, for example, Stassen proposed opening to aerial inspection limited portions of western Russia and Europe and all of the Soviet Union north of the Arctic Circle and east of Lake Baikal, matched by an equal area in the western United States, Alaska, and Canada. Stassen also developed similar details and proposed time-tables concerning the establishment of ground control posts, exchange of military blueprints, reduction of armed forces and armaments, and sharing of information relative to movement of troops on land, sea, and air. All signatories—with the exception of the United States, the Soviet Union, and the United Kingdom—would agree never to manufacture or to use nuclear weapons. The three nuclear powers, for their part, would agree to a moral pledge not to use nuclear weapons except in self-defense; rather they would devote all future production of fissionable material exclusively to nonweapon or peaceful uses. All aspects of Stassen's new proposals but one required establishing satisfactory inspection systems before they would become effective. In a bold departure from previous American policy, Stassen now advocated that the United States accept Zorin's invitation to suspend all nuclear tests for one year without prior agreement on an effective verification system.³⁷

COMMISSION REACTIONS

For more than a week in mid-May 1957, the Eisenhower Administration once again labored over its disarmament policy. And again, Strauss struggled above all else to protect the Commission's nuclear testing program. As he informed Gerard Smith, if the aerial inspection proposals were "fuzzy" and made no sense, Stassen's call for a test moratorium without verification was completely unacceptable to the Commission. While the Atomic Energy

Commission limited its comments to nuclear-related issues, Secretary of Defense Wilson attacked on a broader front by declaring that, despite the prolonged study and deliberation that had established the outer limits of American disarmament policy approved by the President on November 21, 1956, Stassen's new draft went "well beyond" anything that was sound or realistic for long-term agreement.³⁸

On the test moratorium, the Commission was unanimous in support of Strauss. Libby had already reported that the Commission had obtained "no useful fallout information in Operation *Redwing*." In addition to intensive fallout studies planned for Operation *Plumbbob* in fall 1957, Libby announced that a "prime objective" of Operation *Hardtack*, scheduled for 1958, would be to establish accurate data on local fallout so that it could be distinguished from worldwide fallout. Murray, who had angered his fellow Commissioners with an article in *Life* magazine criticizing the United States for its reliance on hydrogen bombs, reminded the Commission that he continued to believe that the United States should unilaterally abandon tests of multimegaton thermonuclear weapons. At the same time, without safeguard agreements with the Soviet Union and other nations, Murray actually favored "greatly accelerating" tests of small, tactical weapons. Commissioner Vance added that a test moratorium might actually obstruct a disarmament agreement because the United States would be severely hampered in developing small nuclear weapons as suggested by Murray. Major General Alfred D. Starbird, director of the division of military application, probably best summed up the Commission's perception by observing that not only would a moratorium jeopardize weapon programs and laboratory budgets but also, once a moratorium on testing was accepted, strong public opinion would probably prevent resumption of testing unless the United States was overtly provoked by a foreign country.³⁹

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THE SCHWEITZER APPEAL

While the London Disarmament Conference met and the American and the Russian negotiators continued to search for policies acceptable to both their governments and their adversaries, international opposition to nuclear testing continued to mount. In March 1957, the Japanese government had sent Professor Masateshi Matsushita on a special mission to the nuclear powers to request an end to nuclear testing. In April, Prime Minister Nehru of India again called for an end to testing, while the British Labour party advocated halting thermonuclear testing by international agreement despite the fact that the United Kingdom was about to test its first hydrogen bomb. In the same month, leading West German nuclear physicists, including Otto Hahn, pledged they would neither construct nor test nuclear weapons.⁴⁰

390 The most dramatic appeal came from Albert Schweitzer, the world-famous musician, doctor, and philosopher in French Equatorial Africa. At the urging of Norman Cousins, editor of the *Saturday Review*, Schweitzer requested the Nobel Peace Prize Committee to provide a platform that would permit him to speak his conscience on testing. Schweitzer, who had been awarded the Nobel Peace Prize in 1952, was granted his request, and on April 24, 1957, Gunnar Jahn, chairman of the Norwegian committee, read the great humanitarian's appeal over Radio Oslo. Although beamed around the world to fifty countries, Schweitzer's message was not heard in the United States. With the exception of the *Saturday Review*, which printed the verbatim text, his statement was largely ignored by the American press. In India, however, Schweitzer's words received wide circulation. Within a few days the Pope endorsed his stand, and on May 10 the West German Bundestag asked the nuclear powers at the London disarmament talks to suspend testing. As if to reply, the British detonated their first thermonuclear test at Christmas Island on May 15 with an assurance by Prime Minister Macmillan that the fallout from the test was "almost negligible."⁴¹

At the Commission, Willard Libby, also a Nobel laureate, assumed personal responsibility for responding to Schweitzer. In an open letter, which received more press attention in the United States than did Schweitzer's original broadcast, Libby appealed to Schweitzer's scientific objectivity. Reiterating the data he had already made public and would again summarize before the American Physical Society on April 26, Libby argued that radiation exposure from fallout was much less than that required to produce observable effects in the general population. As the *New York Times* noted, testing involved taking some risks. But, as Libby asked rhetorically, "Are we willing to take this small and rigidly controlled risk, or would we prefer to run the risk of annihilation which might result if we surrendered the weapons which are so essential to our freedom and our survival?"⁴²

Although Libby's response did not satisfy everyone, he was addressing the key issues. American scientists were becoming more concerned that the long-term effects of fallout would be far greater than Libby estimated. Even before Schweitzer's appeal, five Yale University biophysicists expressed their concern over the irreversible effects of radioactive fallout. Although the Yale professors did not advocate an immediate test ban, one of Libby's former students, Harrison Brown, professor of geophysics at the California Institute of Technology, sided with test-ban advocates when he challenged his mentor in the same issue of the *Saturday Review* that reprinted Libby's reply to Schweitzer. Obviously hurt by his student's rebuttal, Libby wrote Brown that his article was "pretty unobjective" but nevertheless conceded that Brown had "put the question pretty squarely." The

question, of course, was what risks should Americans take in the pursuit of national security.⁴³

On the same day that the British thermonuclear test thundered over Christmas Island, Linus Pauling, another Cal Tech scientist and Nobel Prize winner, told an honors assembly at Washington University in St. Louis that he opposed nuclear testing on humanitarian rather than scientific grounds. Acknowledging his debt to Schweitzer, Pauling stated that no human life should be risked in developing nuclear weapons "that could kill hundreds of millions of human beings, could devastate this beautiful world in which we live." Encouraged by the response from the university audience, Pauling decided to circulate a petition among American scientists calling for an end to nuclear tests. With the assistance of biologist Barry Commoner and physicist Edward Condon, both professors at Washington University, Pauling obtained in a few weeks the signatures of almost two thousand scientists, including Nobel laureate Hermann Muller and Laurence H. Snyder, president of the American Association for the Advancement of Science.⁴⁴

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THE COMMISSION MODERATES ON TESTING ISSUE

The Commission's testing program came under increasing pressure, not only from the White House and the scientific community but also from the Congress. On March 7, 1957, the Joint Committee had announced it would hold hearings "to educate the Committee and the public" about the origins and hazards of radioactive fallout. Although the committee repeatedly insisted that its only purpose in holding the hearings would be to gather scientific information, the Commission could see the obvious implications that the hearings might have for American negotiators at the London disarmament talks. Accordingly, the Commission decided to prepare a "fall-back position" rather than risk being forced by the President to accept Stassen's plan for a test moratorium as a first step toward arms control. Although unable to find an acceptable formula for halting weapon tests without reliable inspection, the Commission was prepared to accept a limitation on tests by the nuclear powers to fifteen megatons per year.⁴⁵

Before the Commission could even offer its "fall-back position," however, Stassen once again seized the initiative by offering modifications and clarification to his May 9 proposals. He anticipated the Commission's shift by proposing that resumption of limited testing be permitted after a twelve-month moratorium, providing advance notice was given and all tests were conducted with due regard to health. Strauss now devised his own "fall-back position," which he shared with Libby: the United States should accept an unverified testing moratorium only on the condition that the

Commission would resume testing after twelve months if adequate inspection controls were not devised. In that way, Strauss believed the Commission could resume testing without appearing to violate the disarmament agreement.⁴⁶

THE STASSEN PLAN DEBATED

392 On May 23, 1957, Stassen presented his newest disarmament proposals to the National Security Council. With Eisenhower present, Stassen reviewed the progress of the recent negotiations in London. The great question yet to be answered, Stassen said, was whether the United States would be willing to take the necessary risks involved in the first steps toward disarmament. Dulles noted that considerable disagreement remained within the government, but he expected the differences could be ironed out before Stassen returned to London. Throughout the meeting, which Strauss silently attended, Eisenhower probed deftly into the details of Stassen's plan. He also repeated his determination to halt the arms race, not only for moral but also for fiscal reasons. Secretary of the Treasury George Humphrey had warned him of severe budgetary and financial problems if military spending were to continue unchecked. Risks with the Russians were great, Eisenhower conceded, but so were the risks to the American economy in inflated defense budgets. The negotiations in London were no mere intellectual exercise, he noted in closing; "we have got to do something."⁴⁷

Economic imperatives were also beginning to motivate the Russians. From London, American Ambassador John Hay Whitney reported that, according to Prime Minister Macmillan, the Russians faced "real economic problem[s]" of their own. The Soviet leaders were beginning to talk seriously of disarmament, but Macmillan was pessimistic that anything constructive would come from the London conference. He predicted that only a summit conference devoted solely to arms control could break the disarmament deadlock.⁴⁸

Shortly after Macmillan and Whitney talked at 10 Downing Street, Eisenhower and Dulles met alone late one evening at the White House to review Stassen's proposals. With the President scheduled to meet his disarmament advisers the following morning, May 25, Dulles was anxious to iron out his differences with Eisenhower ahead of time. By coordinating his presentation with the President, Dulles hoped to avoid the embarrassment of seeing his ideas "hacked away" before Eisenhower had time to focus on the issues. While Dulles discussed the agenda with the President, Strauss was also working behind the scenes to line up supporters for continued testing. General Herbert B. Loper and Admiral Radford assured Strauss that Deputy Secretary of Defense Donald Quarles would join the Commission in opposing Stassen's proposal to suspend testing prior to agreement

on inspection and verification. Strauss may not have been optimistic about his chances on the testing issue, but he was confident that he had the solid support of the Defense Department.⁴⁹

On Saturday morning, May 25, Eisenhower met with a large group of advisers to discuss disarmament policy. Working from Stassen's May 9 proposal as amended on May 22, Dulles in turn reviewed each issue with the exception of testing. With the toughest question temporarily set aside, Dulles led the group through the next most difficult maze: how to implement Open Skies through aerial inspections and exchange of blueprints. Eisenhower apparently favored opening all the United States and all the Soviet Union to mutual overflights, as well as exchanging comprehensive "blueprints" of military installations, stockpiles, and armaments. From the American point of view, the United States would have gained much and lost little from such an exchange. If the Russians insisted that to be comprehensive Open Skies would have to include American overseas bases and allies, the United States would insist upon including Communist China. However intractable, the issues were highly negotiable.⁵⁰

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Dulles gradually worked through the agenda until by the end of the morning only the testing item remained. To Strauss's surprise, Quarles left the room at that point, leaving him as the lone spokesman for continued nuclear testing within the Administration. Strauss described Stassen's proposal as a major departure from the policy established by the President in November 1956 and reaffirmed by the Chief Executive prior to the London talks. Stassen's proposal was wrong, Strauss argued, because it reversed the proper sequence of events by suspending testing before an inspection system was in place. This was the basic, and fatal, flaw in Stassen's plan. There were other problems, to be sure, and Strauss insisted that the United States could not negotiate with the Soviet Union except from a position of strength. Although the United States could maintain indefinitely numerical superiority in nuclear weapons over the Russians, in time the Soviets would obtain sufficient numbers to render the American "lead" relatively unimportant. Strauss believed that the United States could maintain real "qualitative" superiority but not without testing. Through their own development programs and espionage, the Soviets constantly strove to match American weapon technology. Strauss pleaded with Eisenhower:

To maintain our position of strength, we must continue to improve. We cannot continue to improve with our laboratories shrunken and weakened, and we cannot put improvements into stockpiled weapons without tests to see that the improvements are practical.⁵¹

To Strauss's amazement, Dulles countered with a suggestion that the Secretary of State attributed to the absent Quarles. The rebuttal was, in fact, basically Strauss's own fall-back position that he had confided to Libby the previous day: the United States would suspend testing for twelve

months, after which tests would be resumed if no inspection agreement had been signed. Future tests would be announced through the United Nations and would include limited attendance as had been suggested at the recent Bermuda conference. Libby had subsequently lunched with Quarles, with whom he shared Strauss's strategy, and now the chairman sat helpless, apparently "sunk by my own guns." Bail as he might, Strauss could not convince Eisenhower that the weapon laboratories were in jeopardy or that plans to develop small clean bombs for air defense would falter.

When the debate was virtually over, Quarles returned to the meeting but did not participate in the discussion. According to Strauss, no one spoke from the defense side of the table, although after the meeting adjourned both Radford and Loper privately expressed their distress. Thus, the meeting ended with the President endorsing Strauss's fall-back position on Stassen's proposal to end nuclear testing as presented by Dulles but attributed to Quarles. Again Eisenhower reaffirmed his willingness to make real concessions to end the arms race. At the same time, he expressed confidence that Strauss and the Commission would find a way to keep the laboratories strong and intact.

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LONDON CONFERENCE RECONVENES

As the Joint Committee launched its public hearings on the effects of fallout, Stassen returned to London with fresh instructions and renewed determination to secure a disarmament agreement with the Soviet Union. On May 28 and 30, he briefed British officials on the new policy, concentrating almost exclusively on provisions relating to nuclear arms control. Although Stassen did not outline the American position for the British in writing, he summarized the main points relating to testing, first use of nuclear weapons, transfer of special nuclear material to international stockpiles, and the cutoff of the production of weapon-grade nuclear material.⁵²

Inexplicably, on the following day, May 31, despite instructions to the contrary, Stassen gave Zorin an "informal memorandum" that delineated the new American disarmament policy. Herter had warned Stassen not to engage in serious negotiations until the President had approved the policy statement in which all parties concurred. Stassen's incredible behavior can be explained by his eagerness "to do something" to end the arms race as directed by the President and perhaps by his political ambitions. Actually, he had prepared two documents: the first reflected his understanding of the meeting on May 25; and the second presented his "informal" interpretation of the new American position to Zorin.⁵³ Although he had not compromised an official document, his friendly memorandum to Zorin seemed to commit NATO allies to American policy without prior con-

sultation, while at the same time actually misrepresenting the United States' new position.

Consternation was palpable on both sides of the Atlantic, although for very different reasons. In Europe allied leaders were incensed because Stassen, without their consent, had proposed opening most of Western Europe to Soviet aerial inspection. Earlier Dulles had assured West German Chancellor Adenauer that a European zone would not be included in an Open Skies agreement during the first stage of disarmament and certainly would not be established without the consent of America's European allies. Open Skies had been a relatively minor issue at the meeting on May 25. Now Stassen had not only aggravated the NATO allies, but he seemed to commit the Eisenhower Administration to policies not agreed to in Washington and to which the military and the Commission were strongly opposed. Dulles, Strauss, and others met to see how they could repair the damage Stassen had caused.⁵⁴

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For the Commission, Stassen's faux pas was fortuitous because it allowed Strauss to reopen the testing issue while impugning Stassen's reliability as a disarmament negotiator. According to Strauss, Stassen had oversimplified, glossed over, and outright misrepresented American policy. Although Strauss conceded that Stassen's memoranda were generally in accord with the White House agreements, he was distressed that Stassen had played down the inspection system as pro forma. For Strauss, safeguards remained the chief stumbling block to an arms control agreement, not the relatively simple matter that Stassen implied. Angered by Stassen's behavior, Dulles seemed to agree with Strauss's assessment when he privately criticized Stassen for observing "the letter of the law" but skewing it to create "a different impression."⁵⁵

Once again, the famous Eisenhower temper roared within the safe confines of the White House. Furious, the President promised that Dulles would take the necessary steps to correct any misunderstandings. Eisenhower knew the wisdom of not overreacting, but at the same time he was determined to put both Zorin and Stassen on notice that the United States envoy had acted without sanction. Accepting Dulles's advice, Eisenhower bowed to a cooler approach in dealing with Stassen, the Russians, and America's NATO partners.⁵⁶

While Dulles quietly mollified anxious diplomats and government officials at home and abroad, Eisenhower tried to clarify his arms limitation policy in a press conference on June 5. The continuing Joint Committee hearings had intensified public concerns about fallout. In response, Eisenhower told reporters he "would like to allay all anxiety in the world by a total and complete ban of all testing, based upon total disarmament." At the same time, he asserted the importance of testing to develop clean weapons. Clearly, Strauss had not labored in vain. A test ban could only be part

of the first step toward disarmament, according to the President, if it were accompanied by an acceptable inspection system.⁵⁷

In London, Stassen assured reporters that the United States had not yet presented official proposals to the Russians. All discussions had been "entirely preliminary," he asserted. Then, almost offhandedly, he mentioned that he intended to return to the United States to attend his son's graduation from the University of Virginia on Monday, June 10. The trip home would be strictly personal "with no official business," Stassen announced. He did not tell the press, however, that on orders from Dulles to withdraw his "informal memorandum" he had asked Zorin to return the paper. On June 8 Zorin further complicated matters by handing Stassen a formal Soviet reply to the as-yet-unofficial American proposals.⁵⁸

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STASSEN REPRIMANDED

Stassen spent a busy "holiday" in Washington, after celebrating his son's graduation in Charlottesville. Both to Dulles and Herter, Stassen insisted that he had neither violated his instructions nor slighted NATO allies. On the contrary, Stassen countered, he had consulted with the Western delegations on "all points" prior to his meeting with Zorin. The trouble was that the Russians resented the fact that NATO partners, although not represented at the disarmament talks, were nonetheless privy to American policy. Impatient, Zorin had complained to Stassen that he was placed in an impossible position by being the last to learn about the new American proposals. When the Russian had intimated that he might be forced to break off negotiations, Stassen decided to brief his Soviet counterpart informally. Although he had committed no impropriety, he admitted he had angered the British.⁵⁹

Stassen's explanation, however, hardly settled the matter. Zorin reportedly had cautioned that any withdrawal of Stassen's paper "would be detrimental to negotiations." Like a tar-baby, the Americans appeared to be stuck with Stassen's paper whether they liked it or not. As Dulles complained to Senator Knowland, there was even some danger that the Russians might make a commitment that would throw into the Senate's lap an inadequate arms limitation treaty to ratify or reject.⁶⁰

On June 11, with Herter as his witness, Dulles severely reprimanded Stassen for his conduct in London. Acknowledging Stassen's good intentions, Dulles expressed his "shock" and worry over Stassen's apparent insensitivity to diplomatic protocols. Dulles demanded that Stassen refrain from circulating unauthorized documents "without advice and consent from the Department." As a further measure, Dulles informed Stassen that he was appointing a foreign service officer as Stassen's deputy with special responsibilities to provide liaison between NATO and the State Depart-

ment. The following day Dulles sent almost identical assurances to Macmillan and Adenauer: "that with Presidential authority I have had a very thorough review of disarmament proposals with Governor Stassen and that the President and I feel certain that there will be no repetition of unauthorized procedures."⁶¹

Despite these assurances, Dulles did not intend to give America's NATO partners a veto over United States' disarmament policy. Unless disarmament progress was made soon, Dulles feared that several nations, including the United States, might begin unilateral disarmament under the pressures of public opinion and the high costs of military expenditures. He realized that the development of nuclear weapons was in its infancy and that the crude weapons then available were a deterrent only because they were weapons of mass destruction. With the development of more sophisticated tactical nuclear weapons, however, Dulles believed the eventual use of nuclear weapons in war would become inevitable. Ironically, as the era of massive retaliation ended, the likelihood of nuclear warfare increased, especially as fourth powers were able to obtain cheaper, smaller weapons. Dulles could see no way out of this dilemma. Gradually, NATO would become obsolete as the credibility of America's atomic shield diminished and France, and possibly others, obtained nuclear capability. For that reason, Dulles did not believe that NATO sensitivity over European inspection zones should be allowed to derail the disarmament talks.⁶²

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THE SOVIET RESPONSE

Stassen's first task on returning to London in June was to build support among America's NATO allies for the United States' position on the first phase of disarmament. These NATO consultations, including deliberations of the Western Four and separate bilateral discussions between the Americans and the British, French, and Canadians, would build consensus on the issues of aerial inspection, test ban, cutoff of the production of special nuclear materials for weapons, and reduction of conventional armaments.⁶³

No sooner had Stassen returned to London when, on June 14, Zorin announced that the Soviet Union was willing to accept a nuclear test ban with international control and supervision. Mindful that the Western powers would not agree to an unconditional test ban, Zorin proposed a temporary moratorium for a period of two or three years. Most significantly, the Soviet government, with a view to removing the major obstacle to a test moratorium agreement, proposed that an international inspection commission establish control posts in the United States, the United Kingdom, the Soviet Union, and the Pacific test area.⁶⁴ The Russians had made an important concession, and the Allies immediately recognized it. For the first time in the history of postwar disarmament talks, the Soviet Union was ready to

consider establishing inspection posts within the Russian heartland. Stassen's foreign policy objective to breach the Iron Curtain now actually seemed obtainable.

At his June 19 news conference the President was clearly buoyed up by the prospects of a test moratorium. "I would be perfectly delighted," he told reporters, "to make some satisfactory arrangement for temporary suspension of tests while we could determine whether we couldn't make some agreements that would allow it to be a permanent arrangement." The President also reiterated the importance of reliable safeguards but noted that a test ban was not necessarily linked to an agreement on controlling the production of special nuclear material. Assuring the press that he was "intimately acquainted" with the American position presented by Stassen in London, he declined further detailed comment except to confirm his belief that the disarmament conference was not merely a sounding board for propaganda but a real possibility for general agreement.⁶⁵

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THE COMMISSION'S CLEAN BOMB INITIATIVE

Both justifying further testing and answering international concern over fallout, the Atomic Energy Commission had been touting the clean bomb since the 1956 elections. Shortly after he returned from the Enewetak Proving Grounds in July 1956, Strauss had announced that the Commission had discovered new possibilities for perfecting nuclear weapons that concentrated maximum destruction on targets while reducing widespread fallout. Just weeks before his reelection, Eisenhower had reported that the *Redwing* tests had increased the United States' ability "to harness and discipline our weapons more precisely and effectively." As if to endorse the need for continued testing, the President concluded that "further progress along this line is confidently expected."⁶⁶

When the Commission again boasted of progress in its "clean bomb program" on May 29, 1957, the Joint Committee called foul. Coming just four days after the President had approved his new disarmament policy and in the midst of the Joint Committee's fallout hearings, the Commission's announcement smelled of politics. With Senator Anderson's concurrence, Congressman Holifield charged that the Commission was misleading both the Joint Committee and the American people on the potential "cleanliness" of large, multimegaton thermonuclear weapons.⁶⁷

Almost three thousand miles away in Livermore, California, Senator Henry Jackson spent Memorial Day visiting with Ernest Lawrence, Edward Teller, and the laboratory staff. Among other issues, Jackson was particularly interested in the future production requirements for plutonium and tritium at Hanford and Savannah River. His questions naturally led to discussions about the development of weapon systems, the necessity for test-

ing, and the consequences of a test moratorium for the work at the weapon laboratories. As a result of their meeting, Jackson invited the scientists to share their views on production requirements with the Joint Committee's Subcommittee on Military Applications, which the Senator chaired.

At the hearings on June 20, Jackson introduced Lawrence, Teller, and Mark Mills from the Livermore Laboratory. Recalling his recent trip to California, Jackson reported that he "was particularly impressed with the progress that they were making in low-yield weapons, the possibility of making them smaller, the possibility of making them cleaner," and, as he noted, "the gleam in the scientists' eye of making them almost like Ivory Soap, [but] not quite."

In their testimony the California scientists presented a simple but powerful argument for increasing plutonium production and continuing testing. According to the scientists, plutonium weapons could be made smaller, cheaper, and more versatile than uranium weapons; and coincidentally, fusion weapons with very low fission yield would be cleaner than existing hydrogen weapons. As Teller explained it, the United States knew how to build "dirty" bombs of almost unlimited size, but smaller weapons using plutonium still remained to be perfected. For Lawrence the moral choice was stark and unambiguous. "If we stop testing," he warned the committee, "well, God forbid . . . we will have to use weapons that will kill 50 million people that need not have been killed." Somehow, Lawrence said, the American people had to realize the "crime" that would be committed if the United States had to use dirty bombs in war. No one described clean bombs as humane, but Lawrence, Teller, and Mills were moved by no less a moral imperative than Schweitzer or Pauling. Because they believed the fallout hazards from testing were negligible, they thought it would be "wrong," "misguided," and "foolish" to ban the development of weapons that might spare countless millions from nuclear holocaust.⁶⁸

The next day, June 21, Lawrence, Teller, and Mills shared the same message with the full Joint Committee. Again Lawrence repeated his assertion that "it would be a crime against the people" to stop testing. Graphically, Teller described how an attack on Vladivostock might result in the death of thousands of Japanese as fallout drifted eastward. It was imperative for the United States to develop nuclear weapons that limited their destruction to the immediate area of the target. "Dirty" weapons, like poison gas, could contaminate friends and foes alike. In Teller's view, the United States would enjoy an enormous military and psychological advantage in a limited war if it could employ clean weapons while the Russians had no choice but to contaminate innocent populations with fallout from dirty bombs. Furthermore, the United States would be placed in an impossible position should the Soviets secretly develop their own clean weapons during a test ban while an international treaty prohibited the United States from doing so.

Alarmed, Senators Bricker and Pastore wanted to know whether the President, Strauss, or Stassen knew of the imperatives to develop clean weapons. Bricker was haunted by the belief that the recent Joint Committee fallout hearings simply fed Russian propaganda by focusing almost exclusively on the potential dangers of radioactive fallout. The President should know and the Joint Committee's report on fallout should reflect, Bricker said, that continued testing was necessary to perfect the clean bomb, which would "do more to preserve the peace of the world than anything we could do."

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Teller next described various ways by which the Soviet Union could hide underground and upper atmospheric testing during a test ban. He explained how the Russians could muffle underground megaton tests so as to confuse seismic monitoring. Again the Joint Committee wanted to know whether the Administration was aware of this information. Lawrence was embarrassed because as Stassen's adviser he had a clear obligation to keep the Administration adequately informed of technical and scientific impediments to a test ban; instead, Lawrence and his colleagues were actually undermining Congressional confidence in the London negotiations. As diplomatically as possible, Teller explained that Stassen had been briefed on the general possibilities of hiding nuclear explosions, but he did not think that Stassen had heard of the most recent methods. How could he when Paul Foster, representing the Commission at the hearing, admitted that the Commission had learned only the day before about the possibility of an elaborate "clandestine subterranean explosion"?⁶⁹

The Joint Committee members were shocked. On the one hand, everything about which Lawrence, Teller, and Mills had testified pointed in the direction of continuing nuclear testing; on the other, the reports from London all indicated that Stassen was moving in the opposite direction. Although the committee rejected the idea of recalling Stassen from London to testify, Congressman Cole by telephone personally arranged for the Californians to see the President.

Strauss, Lawrence, Teller, and Mills met with Eisenhower for forty minutes on June 24. For the third time that week, Lawrence repeated his litany that the United States' failure to develop clean weapons "could truly be a 'crime against humanity.'" On cue, Teller reviewed the arguments for developing small, tactical fusion weapons, including the psychological and propaganda onus of not producing them. Lawrence proposed inviting a United Nations team to the United States tests to verify that the Americans were testing clean weapons, and Teller outlined how nuclear explosions could actually be used for peaceful purposes.

In contrast to the Joint Committee's reaction, Eisenhower remained calm, albeit interested in the briefing. Tactfully, he agreed that no one could oppose the development program his visitors had outlined. Nevertheless, he reminded them of the mounting worldwide debate over testing.

Grimly, Eisenhower lectured the nuclear scientists that the United States could not "permit itself to be 'crucified on a cross of atoms.'" Furthermore, he emphasized that the test-ban proposals had been offered in the context of stopping war and were, after all, part of the disarmament package. When Mills and Teller tried to counter that a nuclear test ban could not be policed with certainty, Eisenhower responded that testing had not only fueled intense Soviet propaganda but also actually divided American public opinion. When Teller tried to discredit Pauling's open letter by noting how few scientists from the Berkeley campus had actually signed the statement, Eisenhower conceded that, although Pauling might be wrong, so many people were reading "fearsome and horrible" reports about fallout that they were having a substantial effect. Perhaps he could say something in his next news conference to clarify the matter by explaining that the United States wanted to continue testing principally "to clean up weapons and thus protect civilians in event of war."⁷⁰

As the scientists were about to leave, Eisenhower wryly suggested that in the long run the United States might want "the other fellow" to have clean weapons, too—and perhaps it would be desirable for Americans to share their techniques with the Russians. The scientists were dumbfounded by this remark. To the President, and later to Andrew J. Goodpaster, White House staff secretary, just in case Eisenhower had not gotten the point, the visitors stressed that American weapons incorporated technical advances that the United States would not want to give to the Soviets. Teller again raised the ugly possibility that the Russians might secretly perfect a clean bomb as well as clean, peaceful explosives while the United States had no options but dirty weapons. Teller also noted, parenthetically, that it was comparatively easy to contaminate clean weapons with "additives."⁷¹

Lawrence, Teller, and Mills profoundly impressed both Eisenhower and the White House staff and temporarily succeeded in shaking the President's commitment to a nuclear test ban. Following the meeting, Eisenhower complained to Dulles that he had received suggestions from so many people that he was confused. He was especially upset that Strauss and his friends made "it look like a crime to ban tests." As Eisenhower recalled their argument, the most promising peaceful uses of atomic science ironically depended upon developing (and testing) a clean weapon. For the President the most painful dilemma was facing a future dependent on still another round of weapon development. Dulles admitted that the United States could not agree to a test ban independent of sound inspection requirements and other disarmament agreements.⁷²

Writing to Strauss, Bromley Smith, National Security Adviser Cutler's assistant, summarized the disturbing implications of what the scientists had told the President. Smith acknowledged that the scientists not only had a professional interest in testing but also perhaps "an unconscious desire to reduce the horror of nuclear weapons which they are responsible

in large part for creating." Yet, whatever the scientists' motives, they had convinced Smith that without reliable policing the risks of a test ban were too high. As he reported to Strauss, Smith now strongly urged Cutler to give Strauss another chance to present the case against a test ban to the President.⁷³

Although Eisenhower understood the implications of the scientists' briefing, he was unwilling to abandon hope for success in the disarmament talks. As promised, at news conferences on June 26 and July 3 Eisenhower expressed his interest in developing clean bombs and peaceful nuclear explosives, but he did not preclude a test ban, as the scientists had wanted. Indeed, the President spoke as if clean bombs whose fallout had been reduced by 96 percent were an accomplished fact. Furthermore, he indicated that within four or five years, with adequate testing, the United States could develop an "absolutely clean bomb." If the President worried the scientists because he slightly exaggerated even their most optimistic claims, he must have satisfied them by adding his hope that the Soviets would also "learn how to use clean bombs."⁷⁴

402 In New York, David Lilienthal could only shake his head in disgust over the newspaper reports of Lawrence, Teller, and Strauss meeting with the President to promote clean bombs. "The irony of this is so grotesque," he confided to his journal, "it is rather charming." Lilienthal recalled that the same trio had once been so certain that the super H-bomb, "big as all hell," would be the salvation of the country. Ruefully, he also noted that it had been people like himself, and Oppenheimer he might have added, whose patriotism or good sense had been questioned because they harbored doubts about the development of the thermonuclear bomb. Now with the weapon laboratories threatened by disarmament, the super-bomb scientists stumped for small, clean tactical weapons not too different from what Oppenheimer had advocated just four years previously. In sum, Lilienthal characterized the promoters of the clean bomb as pathetic, transparent, and greedy.⁷⁵

CHAPTER 15

POLITICS OF THE PEACEFUL ATOM

The results of the 1956 election gave Lewis Strauss new incentives for promoting the development of nuclear power by private enterprise. On the one hand, the overwhelming endorsement of President Eisenhower at the polls led Strauss to believe that he had a mandate for assigning to private industry most of the responsibility and the financial burden for building the new atomic energy industry. Federal support, Strauss believed, should be confined only to those essential activities in research and development that industry could not or would not undertake. On the other hand, the Democrats had consolidated their hold on both the Senate and the House, and Senator Anderson, although no longer chairman of the Joint Committee, was still in a strong position of leadership. Strauss could anticipate another searching policy debate with the committee at the annual Section 202 hearings in February and another battle with the Democratic Congress over the Gore-Holifield bill. Rather than seeking compromise and conciliation, Strauss proposed to strike out boldly to complete the transfer of certain nuclear technology from government to private hands. If private industry could be induced to finance, build, and operate nuclear power plants incorporating each promising reactor design, there would be no need for the Gore-Holifield bill or "atomic TVAs."¹ Foreign affairs as well as domestic politics, however, frustrated Strauss at every turn.

THE EURATOM CHALLENGE

The Suez crisis in fall 1956, and to a lesser extent the Hungarian revolution of the same year, revitalized EURATOM negotiations in Brussels by emphasizing the need to develop nuclear energy as rapidly as possible as an

alternative to Middle Eastern oil. On November 6, the day after the initial French and British paratroop assaults on Port Said (and election day in the United States), the French and Germans settled their differences, paving the way for approval of EURATOM. The Germans agreed that EURATOM should have a monopoly on the purchase of nuclear fuel; and EURATOM would control but not fully own all fissionable material used in the reactors. The treaty would also allow the French to engage in nuclear weapon development with tests permitted four years later. Provided that the agency's inspection and control authority were acceptable, the community would have access to French weapon research and development as well as to the resulting weapon stockpile.²

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Despite the international crisis and the election campaign, Eisenhower was kept well informed of the developments in Brussels. Dulles and Strauss urged the President to use the Middle East situation as a lever for immediate action on EURATOM. It was important, they advised, for Eisenhower to offer tangible support for EURATOM by advising Paul-Henri Spaak that the United States urgently wanted to discuss cooperative research and development that would help reduce European dependence on Middle Eastern oil. But as Jean Monnet, the veteran French diplomat, later noted, still unresolved was whether the United States would require international agency controls over nuclear materials provided by the United States Atomic Energy Commission. Not overawed by the Suez crisis, Monnet flatly stated that, if the United States had any intentions of imposing international controls over EURATOM activities, it would be better to abandon EURATOM at once. Smarting from military defeat, the French were in no mood to welcome visits from either Russian or Egyptian inspectors representing the international agency.³

Capitalizing on the sense of urgency generated by the Suez war in November 1956, the Brussels conference appointed a committee of three to formulate a politically and technically feasible nuclear power program that would contribute quickly to meeting the energy needs of the Community of Six. Designated as the Three Wise Men were Louis Armand, head of a technical committee of the French Atomic Energy Commissariat; Franz Etzel, vice-president of the Coal and Steel Community; and Francesco Giordani, former chairman of the Italian atomic energy commission. Their official assignment was to determine how quickly nuclear power stations could be constructed, to establish reasonable production targets, and to identify financial and budgetary problems. An equally important aim, however, was to stimulate interest in Europe and the United States. With these interests in mind, Dulles, with Strauss's concurrence, immediately invited the Three Wise Men to the United States to meet with the president, the Atomic Energy Commission, and the Joint Committee.⁴

The arrival of the Wise Men along with Spaak not only enlivened the Washington social scene but also forced the Commission and the State De-

partment to hammer out a policy for EURATOM that would conform to the bilateral agreements already in force. Not wanting further to strain his relationship with Strauss, Dulles encouraged Monnet to explain the risks of negotiating a bilateral agreement with West Germany before consummating a EURATOM agreement. Echoing Spaak's belief that a separate power bilateral with West Germany would be fatal to EURATOM, Monnet played on Strauss's vanity by suggesting that Strauss would receive greater acclaim by waiting and concluding a major agreement with EURATOM than by making a smaller deal with the Germans alone. Meanwhile with Monnet's blessing, the State Department convinced the Germans, the Italians, and the French to confine their bilateral requests to specific projects, which could later be encompassed with the EURATOM community. As Gerard Smith later explained to Strauss, each ambassador had agreed to submit proposals for well-defined nuclear power projects with the clear understanding that any agreements reached with the United States would be only temporary pending establishment of EURATOM.⁵

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Dulles received the Three Wise Men with enthusiasm. He told Strauss that their mission would be of great political importance to both Europe and the United States. Dulles was inclined to accept the Wise Men's opinion that a constructive relationship between Middle East oil-producing states and Europe was impossible as long as Europe was totally dependent on Arab oil imports. Without referring to the United States' corporate oil interests, Dulles saw the Wise Men's proposal as a "bold program of building nuclear power stations." Consequently, Dulles believed, American assistance would not only promote European economic solidarity but also reestablish friendship and cooperation between Western Europe and the United States following the strains that developed during the Suez crisis.⁶

DOMESTIC IMPLICATIONS

For Strauss the key to developing nuclear power was not international cooperation but the domestic power demonstration program, launched by the Commission just two years earlier in the closing days of 1954. Although industry response to the first two invitations had been gratifying, progress in building the nuclear plants had been slow. To forestall renewed Democratic demands in 1957 for a massive federal effort, Strauss had encouraged the Commission to issue a third invitation late in 1956. The third round of invitations offered private industry more flexibility in developing engineering proposals and more liberal terms for government assistance than the two earlier versions had permitted. Strauss anticipated a prompt response from industry early in 1957, long before the Joint Committee could introduce a new version of the Gore-Holifield bill.

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Strauss's plan for a self-starting nuclear industry, however, contained one dangerous flaw: its success necessarily depended upon the initiative of private business leaders acting in the interests of their own companies. In the face of new economic and political pressures, Strauss would have very little opportunity to respond in a way convincing to his antagonists in Congress. This inherent weakness in Strauss's leadership became apparent when the Commissioners considered their response to the EURATOM proposal. Commissioner Vance at once saw "the necessity that we develop and adopt as quickly as possible a separate and distinct policy for promoting the building of nuclear power plants abroad by American manufacturers—a plan . . . characterized by boldness and imagination." The nation's domestic plan for nuclear power, Vance observed, was quite properly based upon a careful and deliberate development of power reactor technology by government and industry. The energy crisis in Western Europe, however, demanded a quicker response than domestic needs required. Europe clearly faced the prospect of importing 100 million tons of coal annually at a cost of \$2 billion. By 1975, the requirement might run to the "impossible level" of 300 million tons and \$6 billion annually.⁷

To meet that demand, the EURATOM leaders were seriously proposing to bring into operation in the mid-1960s nuclear power plants with an aggregate capacity of fifteen million electrical kilowatts. Vance believed that the reactors selected to meet the European demand would be either slightly enriched, water-cooled reactors like those being built by Westinghouse and General Electric in the United States or a natural uranium, gas-cooled reactor developed by the British. Because electricity produced at nine to twelve mills per kilowatt of installed capacity would be competitive in Europe, Vance was confident that American designs could be made attractive to EURATOM. The United States could also offer help in improving the design of fuel elements, assure the Europeans of a reliable supply of enriched fuel, and offer the advantages of standardized, economical mass production that America's rapidly growing nuclear technology made possible.

No member of either the Commission or the Joint Committee was prepared to reject Vance's argument for a strong American bid, but there was broad disagreement about how the nation could or should respond. At the 202 hearings later that month, Strauss made his now familiar case for giving the responsibility to private industry. Commissioner Murray responded with his equally familiar argument that the national interest required the Commission to lead the way by building full-scale power plants using each promising reactor design. Two years' experience with the power demonstration program had proved to Murray that private industry could not finance such an effort, that industry had badly underestimated the difficulties involved in designing and building nuclear power plants, and that

industry opposition to any form of government development originated in an irrational fear of an "atomic TVA."⁸

Senator Anderson, Congressman Holifield, and other members of the Joint Committee used the hearings to bring out the fact that inflation and rising estimates of plant costs were already dampening industry interest in nuclear power. Compared to Britain's aggressive plan for building gas-cooled power reactors, the American program looked small and unfocused. The only full-scale nuclear plant then under construction in the United States was the Shippingport unit, but escalating construction costs at Shippingport threatened to push electrical rates from that plant to five to ten times those of fossil-fueled power stations. From the perspective of competitive economics, Shippingport was hardly an attractive selling point for American technology.⁹

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THE QUESTION OF SUBSIDY

Within the limitations of Strauss's private enterprise philosophy, the Commission could not do much more to meet the EURATOM challenge than advocate for American manufacturers forms of assistance that would make the United States competitive in the European market. During spring 1957, the Commission considered several staff proposals that would have given development allowances to American companies. These allowances would have covered research and development costs for all components of the plant so as to reduce capital costs charged to European producers. Similar allowances for manufacturing improved fuel elements and reactor cores would have helped to reduce operating costs, thereby making American reactors more competitive with British units. The assistance plan would have cost \$200 million over twelve years and was intended to result in the sale and construction of at least one million kilowatts of nuclear capacity for EURATOM utilities by 1967, the target date established by the Three Wise Men.¹⁰

Strauss found it impossible to push the allowance plan through the Commission with only Libby's support. Both Murray and Vance had strong reservations about it, and with no one appointed to von Neumann's seat following his death in February there was no tie-breaking vote. Murray was pleased that the Commission was now prepared to advocate a million-kilowatt program, which he had urged a year earlier, but he did not believe private industry could meet the goal either with or without the allowances. Vance feared that both Congress and the public would consider the allowances a subsidy of European power stations, a move that seemed unacceptable when neither the Commission nor the Administration was prepared to grant subsidies for domestic projects. Vance also doubted that Congress

would even appropriate enough money to support the program. In place of the allowance plan, Vance proposed much less costly measures that he believed would apply more directly to the needs of the European market: firm commitments to furnish enriched fuel for each reactor built, assurances that chemical processing facilities for spent fuel elements would be available, a commitment to purchase all plutonium generated in the power reactors, liberal terms for selling or leasing uranium or reactor materials such as heavy water, and some solution to the problem of third-party liability for American manufacturers. Such measures, Vance thought, would compete with potential British offers to reprocess or repurchase spent fuel elements for fixed amounts and to guarantee the performance of fuel elements. Neither Strauss, Libby, nor the Commission staff accepted Vance's proposals, and the whole question was put aside pending new appointments to the Commission.¹¹

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NEW FACES ON THE COMMISSION

In June 1957, Strauss had an opportunity to fill two vacancies on the Commission. Despite determined efforts by the Democratic majority on the Joint Committee to obtain Murray's reappointment, Strauss's relentless antagonist was forced to retire from the Commission but not from the debate over nuclear policy. As a consultant to the Joint Committee he continued to speak out until the end of the Eisenhower Administration. Much as Strauss might have hoped to replace Murray and von Neumann with congenial colleagues, his deteriorating relationship with the Joint Committee suggested the need for at least a show of conciliation. Thus, neither seat went to a Republican or to a Strauss associate. To fill out von Neumann's term, the President appointed John S. Graham, a fifty-one-year-old lawyer who had served in the Navy during World War II and as Assistant Secretary of the Treasury during Truman's second term. A Democrat, Graham had been national treasurer of Volunteers for Stevenson in 1956. During the early Eisenhower years, he had made his way successfully in Washington as a financial and business consultant. Graham was prepared to assume Murray's role as spokesman within the Commission for the Democratic majority on the Joint Committee, but he lacked Murray's detailed knowledge of the Commission's program, his predecessor's technical knowledge as an engineer, and, most of all, Murray's stubborn partisanship. The full five-year term went to John F. Floberg who, like Graham, was a Navy veteran of World War II and a lawyer. Ten years younger than Graham, Floberg had been Assistant Secretary of the Navy for Air during Truman's second term, but he considered himself an independent. His only contact with the Commission had come during his Pentagon service, when he had supported Rickover in his fight for nuclear propulsion in the Navy.¹² Strauss could not

count on either Graham or Floberg for automatic support, but neither would he have to endure the kind of persistent and sometimes spiteful opposition that Murray had brought to Commission meetings.

THE CONGRESSIONAL INITIATIVE

The stalemate over reactor policy and the transition in Commission membership cost Strauss the initiative he had sought in his continuing struggle with the Democratic members of the Joint Committee. While Strauss was trying vainly to forge a credible response to the EURATOM challenge, Senator Anderson was moving ahead on all fronts to turn the Democratic defeats on atomic energy legislation in 1956 into solid victories in 1957. In March 1957 Anderson told Strauss that his failure to join the Democrats in a compromise nuclear power bill in 1956 had given Gore the chance to push his extreme measure through the Senate. This year, Anderson said, he planned to come up with a more workable solution, and he warned Strauss that the insurance indemnity bill, which the nuclear manufacturers demanded, would be bottled up until Strauss showed more signs of cooperating with the committee on nuclear power legislation.¹³

As things turned out, Anderson soon received help from an unexpected source. On April 16, Congressman Clarence Cannon, the crusty old chairman of the House Appropriations Committee, launched a blistering attack on the Commission's power demonstration reactor program. Cannon claimed that, because no project had been specifically authorized by Congress, the Commission—and in some instances the Joint Committee—had acted outside the authority of the Atomic Energy Act. Few people seemed to take seriously Cannon's charges of illegality, but the incident gave Anderson and the Joint Committee Democrats a new opportunity to gain leverage over the Commission's nuclear power program. Under existing law, the cooperative program was supported with funds from the operating budget and, hence, was not subject to Congressional authorization. If, as Cannon suggested, the act were amended to require authorization of demonstration projects, the Joint Committee would have a voice in determining which projects were approved and on what terms.

Anderson and his colleagues knew that open support of Cannon's position would expose them to charges of delaying the nuclear power projects, but they could offer to "cooperate" with the Commission by authorizing the projects as Cannon had demanded without changing the law. Although unhappy about establishing such a precedent, the Commissioners acquiesced in the process. Privately, in considering Strauss's plan for development allowances, they had concluded that the authorization process was the only way of both spreading the costs over several budget years and avoiding at the outset seeking all the operating funds needed for such pro-

jects. Thus, the act was not amended, and the Commission appeared before the Joint Committee to seek the authorization just as if it had been. The results were what both sides anticipated: the total authorization for the demonstration reactor program covered all the surviving projects in the first and second round and \$30 million for the third round. The committee also added two new government projects: an experimental reactor to test the recycling of plutonium fuel at Hanford and engineering studies for a natural-uranium, graphite-moderated, gas-cooled power reactor.¹⁴

410 Once the authorization bill had been revised to the satisfaction of Joint Committee Democrats, Congressman Price and Senator Anderson introduced the insurance indemnity measure, which quickly passed both houses. The act required, among other things, that operators of large power reactors carry the maximum amount of insurance coverage available from private companies. The licensees and their suppliers were indemnified by the act for \$500 million over the amount of private coverage available, and public liability was limited for each accident to the total amount of federal and private protection. Thus was established the Price-Anderson Act, which in the 1960s became a controversial issue in the nuclear power debate. Also, reflecting the Joint Committee's dispute with the Commission over the construction permit for the Fermi power reactor project, the new law made the Commission's advisory committee on reactor safeguards a statutory body and required that its reports be made public.¹⁵

FADING PROSPECTS FOR NUCLEAR POWER

During winter 1957, Kenneth Davis, the Commission's director of reactor development, had tried to bolster the sagging spirits of American industrial leaders, who were becoming increasingly disillusioned by the fading prospects for nuclear power. Davis told the Nuclear Congress in March that his long-range estimates for nuclear capacity were somewhat higher than they had been two years earlier, more than 227,000 megawatts by 1980, compared to 175,000 predicted for that date in 1955. Nuclear power costs were certain to be high for first-generation plants like Shippingport, but Davis believed that economics of scale and standardization would likely bring costs into the range of nine to twelve mills per kilowatt-hour by the mid-1960s. Further improvements, Davis thought, might bring power costs down to six or seven mills by 1980.¹⁶

Despite Davis's optimistic prediction, achievement in the Commission's reactor program continued to be unimpressive in 1957. It was true that the five reactor experiments in the original five-year program had now grown to twelve projects, which included studies of a wide variety of reactor designs. Of the five experimental reactors that had been operated, however, two had revealed serious design problems, two were only in the initial

Table 2
The United States Nuclear Reactor Program, Status in June 1957

<i>GOVERNMENT PROJECTS</i>			
<i>Reactor</i>	<i>Location</i>	<i>Design Power (ekw)</i>	<i>Status</i>
<i>Five-Year Program</i>			
Experimental Breeder Reactor No. 1	NRTS ^a	200	Shut down for new core
Experimental Boiling Water Reactor	ANL ^b	5,000	Initial testing
Homogeneous Reactor Experiment No. 2	ORNL ^c	300	Shut down for leaks
Sodium Reactor Experiment	Santa Susanna, CA	20,000	Initial testing
Pressurized Water Reactor	Shippingport, PA	60,000	Nearing completion
<i>Experimental Power Reactor Program</i>			
Boiling Water Reactor Experiment No. 4	NRTS ^a	2,400	Testing fuel rods
Argonne Boiling Water Reactor Facility	ANL ^b	None	Preliminary design
Experimental Breeder Reactor No. 2	NRTS ^a	20,000	In development
Los Alamos Molten Plutonium Experiment No. 1	LASL ^d	None	In development
Army Package Power Reactor (Pressurized Water)	Ft. Belvoir, VA	1,855	Operating
Los Alamos Power Reactor Experiment No. 2 (aqueous homo.)	LASL ^d	None	In development
Organic Moderated Reactor Experiment	NRTS ^a	5,000- 16,000	Construction complete
Liquid Metal Fueled Reactor Experiment	BNL ^e	None	In design
Gas-Cooled Reactor Experiment	NRTS ^a	None	In design

^aNRTS National Reactor Testing Station

^bANL Argonne National Laboratory

^cORNL Oak Ridge National Laboratory

^dLASL Los Alamos Scientific Laboratory

^eBNL Brookhaven National Laboratory

(continued next page)

Table 2, cont.
The United States Nuclear Reactor Program, Status in June 1957

<i>GOVERNMENT PROJECTS</i>				
<i>Organization and Location</i>	<i>Type</i>	<i>Principal Contractor</i>	<i>Design Power (ekw)</i>	<i>Status</i>
<i>Power Demonstration Reactor Program: First Round</i>				
Power Reactor Dev. Company Laguna Beach, MI	Fast Breeder	PRDC ^f	100,000	Design & prelim. construction
Yankee Atomic Electric Co., Rowe, MA	Pressurized Water	Westinghouse	134,000	Design
Consumers Public Power District, Hallam, NB	Sodium Graphite	Atomics Int'l	75,000	Contract negotiations
Nuclear Power Group	Boiling Water	General Electric	180,000	Converted to an independent project
<i>Power Demonstration Reactor Program: Second Round</i>				
Rural Cooperative Power Association, Elk River, MN	Boiling Water	AMF Atomics Inc.	22,000	Contract negotiations
Wolverine Electric Cooperative, Hersey, MI	Aqueous Homo.	Foster Wheeler Corp.	10,000	Contract
Chugach Electric Assoc., Anchorage, AK	Sodium Heavy Water	Nuclear Dev. Corp. of America	10,000	Preliminary design

^fPRDC Power Reactor Development Company

stages of operation, and the fifth was really a test device. None had suggested a promising new approach to nuclear power. In the power demonstration reactor program, two of the three first-round projects were still alive but not yet in advanced design. Four of the seven proposals in the second round had been accepted for contract negotiation in fall 1956, but eight months later no agreement on contract terms had been reached. Only two proposals had been received in response to the third invitation, and only one of these seemed likely to survive.

Table 2, cont.
The United States Nuclear Reactor Program, Status in June 1957

<i>GOVERNMENT PROJECTS</i>				
<i>Organization and Location</i>	<i>Type</i>	<i>Principal Contractor</i>	<i>Design Power (ekw)</i>	<i>Status</i>
City of Piqua, OH	Organic Moderated	Atomics Int'l	12,500	Contract negotiations
<i>Power Demonstration Reactor Program: Third Round</i>				
Northern States Power Co., Sioux Falls, SD	Boiling Water	Allis Chalmers Mfg. Co.	66,000	Contract negotiations
Florida Nuclear Power	Nat-U, Heavy-Water Moderated, Gas-Cooled		136,000	Under study
<i>INDEPENDENT PROJECTS</i>				
<i>Organization and Location</i>	<i>Type</i>	<i>Principal Contractor</i>	<i>Design Power (ekw)</i>	<i>Status</i>
Con. Edison of NY, Indian Point, NY	Pressurized Water	Babcock & Wilcox	275,000	Construction
Commonwealth Edison Co., Joliet, IL	Boiling Water	General Electric	180,000	Construction
General Electric, Vallecitos, CA	Boiling Water	General Electric	5,000	Construction
Penn Power & Light Co.	Aqueous Homo.	Westinghouse	150,000	Preliminary research

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During summer 1957 members of the atomic energy establishment maintained a tone of optimism in public, but behind the scenes there was growing concern. Walter H. Zinn, an old hand in reactor engineering and recently a consultant to the Joint Committee, privately expressed to Strauss his conviction that the United States was following the wrong path to nuclear power. In Zinn's opinion, the decision to concentrate on water-cooled reactors (pressurized or boiling) using enriched fuel had been a mistake. Zinn now favored natural-uranium reactors using a liquid coolant such as sodium. What bothered Zinn even more was the failure of the Commission's reactor development division to commit itself on any strategy while it waited

for industry to make a decision by way of demonstration reactor proposals. In talking with Strauss, Zinn was careful to blame Davis and his staff for this failure to act, but he must have known that the fault rested more with Strauss than with Davis, who had heard similar complaints from others in the reactor industry.¹⁷

By autumn, signs of trouble were visible to the public. AMF Atomic announced that its estimated costs for building the Elk River plant now exceeded the ceiling established by the Commission. Similar difficulties had caused the Foster Wheeler Corporation to back out of the *Wolverine* project altogether. As *Nucleonics* reported that "confusion" had broken out in the nuclear power industry as a result of these announcements, the Commission reconvened its reactor advisory group for the first time in more than a year. The group included eleven prominent scientists and engineers representing the national laboratories and the university contractors, who joined two Commissioners, the general manager, and the headquarters reactor development staff for meetings in Washington during mid-October.¹⁸

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ECONOMIC REALITIES

The focus of the October meeting of reactor experts was on the economic potential of nuclear power. The group concluded that major reductions in both capital and fuel costs would be necessary if American manufacturers expected to sell reactors at home or abroad. Capital costs were likely to be reduced only if the water-reactor plants then being developed produced substantially more power than their design ratings. Fuel costs could be reduced, but only after substantial research and development over a period of years. In fact, the group believed that a long campaign of patient and painstaking development, rather than a dramatic technical breakthrough, was the likely road to nuclear power. And even then, the only hope seemed to be in very large reactor plants that took advantage of economies of scale. The group concluded that the Commission was working on too many types of reactors and that there was "too much breadth and not enough depth" in the reactor program.

Davis presented some of these same ideas in public two weeks later when he addressed the Atomic Industrial Forum in New York City. Although he believed that new types of reactors not yet developed would prove most economical in the long run, he thought that the best type for early achievement of a competitive plant rested with very large installations of water-cooled reactors. Without revising his earlier projection that as much as one-third of the nation's electricity might come from nuclear plants by 1980, Davis admitted that such a prediction would be realized only through hard work and close cooperation between government and industry. Per-

haps nuclear power could not be competitive with conventional plants in the United States until the supply of low-cost fossil fuels began to decline, "at least 50 years" in the future. The real question was whether nuclear power could be made competitive within a decade or so. The next step, Davis believed, was "to obtain general agreement on a realistic program which would involve the necessary economic and technical incentives to reduce capital costs and particularly to reduce fuel costs."¹⁹

The twelfth American Assembly, meeting at Arden House in Harri-man, New York, during that same month, agreed with Davis that, although nuclear power was not likely to be competitive domestically "for some years," long-range demand projections for electricity made research and development necessary. Such development, the Assembly believed, would come about only if the government continued to support private industry. The need for a partnership between government and industry raised the old specter of a public-versus-private power fight, a hazard that could be avoided, in the Assembly's opinion, by making government assistance equally available to public and private groups. The EURATOM plan announced by the Three Wise Men made an immediate response from the United States imperative; the new appreciation of the technical complexity and cost of developing nuclear power made federal participation essential, and that would require the Commission "to strengthen its internal administration of the program, with primary emphasis on positive accomplishment of its objectives in the power field."²⁰

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THE LAST BEST HOPE

The report of the American Assembly carried a temperate but firm criticism of the Commission's performance under Strauss's leadership. Strauss indeed implied to Eisenhower that the report was simply a partisan attack by noting that Henry Smyth, Sumner Pike, and Robert Oppenheimer had participated in the conference. But, in fact, the assembly that year included more than fifty scientists, engineers, business leaders, and journalists representing a broad range of opinions. Perhaps Strauss did not know that Eisenhower had been interested in establishing the assembly as a nonpartisan group when he was president of Columbia University. About half the group, including Commissioner Vance, either had been or were still associated with the Commission.²¹ Thus, the report was not easily dismissed, as Strauss hoped it would be. Even more important, it demonstrated a substantial consensus that the Commission needed a new approach to developing civilian power.

Strauss's last, best hope for avoiding a large government program was to rally American industry to the cause. Such a move would not be

easy during those hectic weeks after the Soviet launch of *Sputnik I*, when the Administration was drafting plans for massive government support for science and technology. From the Joint Committee, Congressman Melvin Price was already appealing to the President to revitalize the development of a nuclear-powered aircraft with federal funds.²² Strauss, however, was not about to be stampeded. Since summer 1953, he had resisted appeals from all sides, even from his own staff, that the Commission support the construction of nuclear power plants. As chairman, he easily quashed any such initiatives by turning his attention elsewhere and ignoring the reactor development division. Instead, he concentrated on private phone calls and meetings with industry executives who might be helpful in launching an impressive plan for private development of nuclear power. In this endeavor Strauss relied on Robert W. Zehring, an economist with both business and government experience who had joined Strauss's staff in spring 1956. An examiner in the Bureau of the Budget during World War II and the Korean War, Zehring had served as a consultant to Congressman John Taber, chairman of the House Appropriations Committee, during the early Eisenhower years. Zehring, who seemed to know everyone in the reactor industry, scouted lobbyists, trade organizations, and corporate boardrooms for bits of intelligence that might be useful to Strauss.²³

The only concession that Strauss was willing to grant his colleagues was to agree to a series of three meetings successively with utility executives, equipment manufacturers, and atomic energy consultants on three days early in December. The scope of the meetings was to be limited, however, to technical aspects "and should avoid such topics as the political and financial factors." The Commission also insisted on personally reviewing the invitation lists, presumably to assure that the meetings did not become a forum for those supporting government action. The only exception came when the Commission, on Vance's request, agreed to invite Smyth, whose participation in the American Assembly conference had not enhanced Strauss's confidence in his former colleague.²⁴

Strauss was probably even less enthusiastic about the forthcoming industry conferences when he received a confidential report from Zehring on November 4. In the corridors and barrooms at the Atomic Industrial Forum meetings in New York the previous week, Zehring had heard "moans and groans" about the high cost of developing nuclear power and the tough technical problems to be solved. Some equipment manufacturers were talking of dropping out of the nuclear business, and a few executives whom Zehring met thought it was "disgraceful" that large private utility groups had held back from supporting arrangements that could easily have financed nuclear projects. Zehring found the utility executives so gun-shy of nuclear power that there seemed little hope that the industry meetings would have any effect. The only way to save the situation would be for

Strauss to use his prestige in talking individually with selected utility executives to convince them to go nuclear.²⁵

DAVIS PROPOSES A NEW COURSE

The next day, Strauss attended a Commission briefing by Kenneth Davis and his staff. The agenda called for the Commission to discuss plans for the December industry meetings, but the real purpose was to hear an appeal from Davis for a major change of course in reactor development policy. Reflecting the views of the American Assembly, Davis declared that the Commission had reached a crossroads: "positive and effective action [was] absolutely necessary." Unless the Commission went beyond the "mere development of technology" to take the leadership in building power reactors, that task would be assumed by James T. Ramey and his staff at the Joint Committee, an eventuality that "could set the whole development back by years." The Commission, in Davis's opinion, needed to reach agreement with industry and the Joint Committee on a strong program, appoint someone to serve as its spokesman, and then seek the money and changes in the Atomic Energy Act that would be needed to accomplish it.²⁶

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Davis pulled no punches in describing the demoralized state of the nuclear industry. A new awareness of the costs and technical difficulties had come at a time when the economy was leveling off and investment money was tight. The rush to nuclear power by American industry, Davis said, had brought in more companies than could possibly survive, and some were already beginning to drop out. Most companies likely to build large-scale reactor plants had already announced their intentions, and some of these were already in trouble. In the meantime, Davis noted, the Commission had done nothing to support the economic development of water reactors, the one type likely to be useful in the next decade. Equipment manufacturers, Davis reported, saw no prospects of any help from the Commission. Financial and legal requirements imposed on the negotiation of power demonstration agreements left the manufacturers with no flexibility, and the Commission's failure to obtain construction funds for projects it had declared urgent had left contractors "despondent."

In analyzing the technical problems facing American industry, Davis followed closely the arguments he had used successfully with the reactor advisory group in October. The United States was not likely, in Davis's opinion, to be successful in selling abroad reactors that would not be economical at home. The nation's only hope, then, over the next decade was for water reactors, and these could come only with the building and operation of large-scale prototypes.

As Davis made clear in a second briefing three days later, the pro-

totypes were not to be half-baked demonstration projects based on some utility's enchantment with an exotic reactor design but rather hardheaded engineering development efforts supervised by Davis and his staff under Commission contracts. All the projects, at least initially, would use water reactors, and all would be one hundred megawatts or larger in electrical capacity. Only after qualified architect-engineers had completed acceptable design studies and schedules under Commission contract would the Commission invite industry to design, build, and operate the plant. Davis proposed that the Commission adopt a ten-year program to develop and build large-scale prototypes.²⁷

STRAUSS AND STALEMATE

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Davis's earnest appeal for a ten-year program did not move the Commission to precipitate action. Strauss failed to see why any change in Commission policy was needed. As for the most promising type of reactor for development, Strauss favored Zinn's choice of a large natural-uranium, heavy-water reactor. Vance agreed with Davis's choice of water reactors and the need for a prompt decision by the Commission, but he thought financial assistance from the government should be limited to research and development only, and most of that on improvement of fuel elements. Floberg did not agree that small reactors should be excluded, and his colleagues concurred. Strauss finally suggested that any decision on Davis's plan be postponed until the leading experts in the field could discuss the issues in a series of meetings during November and December 1957.²⁸

Whether or not Strauss anticipated the outcome, the meetings of reactor experts tended to confuse rather than focus the issues. The two-day seminar sponsored by the Joint Committee on November 21 and 22 was off-the-record, but Strauss was able to get a detailed report of the discussion from some confidential source other than Zehring. The reactor designers and builders represented at the seminar agreed with Davis that the most urgent need was for a clear statement of reactor policy and preferably a ten-year plan. There were both considerable support for Davis's desire to encourage large-scale plants and strong objection to Davis's idea of concentrating on water reactors.²⁹

The latter opinion became a repetitious theme in the three industry conferences held by the Commission early in December. Utility executives in particular complained that they did not yet know enough about the various types of reactors to be willing to commit themselves to one concept. The same group favored an orderly research and development program financed by the Commission to explore the alternatives to water reactors rather than rushing into the construction of large reactors that would produce very expensive power. The equipment manufacturers and consultants

meeting separately later in the week added technical reasons opposing a concentration on one type of reactor. If Strauss needed any arguments to undercut Davis's proposal, the seminars sponsored by the Joint Committee and Commission provided them.³⁰

At the same time, however, the seminars did little to advance Strauss's desire to keep power reactor development in the hands of private industry. Two weeks before the Commission's meetings with industry leaders, Zehring warned Strauss that the major utility companies were prepared to make a nuclear commitment only under certain conditions. A group of utility executives on November 22 had decided to cooperate only after rejecting a strong minority proposition that the industry organize an all-out fight against any government program. The majority decided that the utilities would put up some private capital to build two or three large nuclear power plants if the Commission announced in advance that the reactors were needed to bolster American prestige abroad or to promote national security. The Commission would have to tell the utilities what kind of reactors to build and how large they should be. The industry would expect the government to share research and development costs and to pay the difference between actual construction costs and those for an equivalent conventional plant. The utilities would own and operate the plants but would expect a government subsidy in the form of a steam price greater than the cost of steam from a conventional plant. The group agreed to assemble in Washington the day before the Commission meeting to clear its final statement, if the Commission should by that time announce its own intentions.³¹

Although forewarned by Zehring, Strauss made no move to commit the Commission to a nuclear power program that would have involved subsidies to industry. Lacking any word from the Commission on the day of the meeting, the utility executives delayed a final decision until it was clear that the desired commitment would not be forthcoming. During the morning recess in the meeting one member of the group told Zehring that the proposal was dead.³² With that decision, Strauss lost his last chance for an expanding development effort by private industry. Apparently Strauss was unwilling to compromise his private enterprise principles in order to win a token of industrial participation. Now he would have to take his chances with the Democratic majority of the Joint Committee.

SUCCESS AT SHIPPINGPORT

In the Commission's seminars with industry leaders, the most significant recent event in the development of nuclear power was scarcely mentioned—the initial operation of the pressurized-water reactor at Shippingport on December 2, 1957. Since the Commission had approved the project

in summer 1953, Rickover and his staff had been engaged in a Herculean task to build the nation's first full-scale nuclear power plant and have it operating in a little more than four years. Detailed design and engineering studies had taken most of the time of the Westinghouse staff for the first eighteen months, and no significant construction had begun on the Shippingport site in western Pennsylvania until spring 1955. Then, with the design only 15 percent complete, Rickover had approved a schedule calling for finishing the entire plant in just twenty-four months. With relatively little experience in managing large construction projects, Rickover and his staff soon encountered such unfamiliar problems as jurisdictional disputes, slow-downs, strikes, and poor performance that frequently plagued labor relations in the construction industry. Steel shortages had delayed the project for three months in 1956, and a strike in South Philadelphia delayed delivery of the turbogenerator until February 1957, when the plant was scheduled to be virtually complete.³³

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Deeply concerned, Strauss had asked Rickover to do everything possible to have the plant in operation before the end of the year. Although it hardly seemed possible, Rickover further increased the tempo of the project during spring and summer 1957. Reorganizing both his own staff and the Westinghouse group at Bettis concentrated an enormous array of talent and resources on the project. While extraordinary efforts were made to complete the reactor core and instrumentation, Westinghouse tested every valve, every switch, and every inch of pipe and electrical cable on the site. Pipes were flooded with demineralized water until every trace of dirt had been washed away. Hundreds of valves and instruments already installed were found defective, ripped out, and rushed back to the manufacturers for repair or modification. On October 6, 1957, Westinghouse installed the reactor core. Then the head was bolted and welded in place; the control rod drives and the final instrumentation were installed. The reactor first went critical early on the morning of December 2, fifteen years to the day after Enrico Fermi in Chicago had achieved the world's first nuclear chain reaction. Sixteen days later, on December 18, the turbine was synchronized with the generator, and Duquesne personnel took over operation of the plant. At 11:10 a.m. on December 23, just eight days before the end of the year, the reactor reached its full net power rating of sixty megawatts of electricity.

Strauss was no doubt gratified that Rickover had completed the reactor in time to include the accomplishment in his year-end report, which stressed the Commission's accomplishments in developing power reactors. Strauss's enthusiasm, however, was tempered by the fact that Shippingport, for all its success, represented just the kind of reactor project that he was trying to avoid. A reactor completely financed by the government and built under almost total control by a naval officer was hardly a useful

model for private enterprise. In fact, Rickover's heavy-handed methods in dealing with contractors had become so notorious that his name was now anathema among the industry executives who attended the Commission's December briefings. For example, one utility company executive reported to Zehring:

Although there is a certain grudging respect for Rickover's engineering knowledge and dedication to the job, he is generally regarded as such an egotistical SOB that progress has been made on these contracts despite his personality rather than because of it. Some companies under contract with Rickover have taken the abuse in order to get the dollars. Others who might have the capacity to participate say "To hell with him" and stay away from the program because they will simply not stand his dictation or shift personnel as he frequently demands.³⁴

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Many industry leaders, especially those representing the electric utilities, were not overly impressed by Rickover's accomplishments. They tended to see the Shippingport plant as a simple and not very useful scale-up of the *Nautilus* power plant. For such men, the plant proved nothing because it had not been built by private industry to commercial specifications, and the high cost of the plant seemed to discourage rather than encourage further development. The heavy expenditures in 1957 to complete the plant before the end of the year had greatly increased total costs, which Rickover estimated at close to sixty-four mills per kilowatt of capacity as compared to six mills for existing conventional power plants.³⁵

The significance of the Shippingport project was not yet wholly apparent to most people. Most readily evident was the exceptional performance of the plant at power levels far above its design rating and virtually free of operational faults or failures from the day of its first operation. As more information about the project became available to the public, it was obvious that the plant was not simply a scale-up of the *Nautilus* plant; rather it represented a fundamentally new conception of reactor design specifically for the production of electric power. Following the engineering practices that Rickover had developed in the Navy project, his staff and the Westinghouse engineers had painfully thought through the essential design characteristics of the plant and then translated them methodically and literally into the specifications for every component. The pressure vessel, towering almost thirty-five feet in height with a diameter of more than ten feet and a weight of 264 tons, approached the technical limits of steel fabrication at that time. Likewise, the required performance of the pumps, valves, and steam generators pushed design engineering and fabrication into unexplored realms of technology. The reactor core, consisting of almost 100,000 fuel elements, each meticulously encased in the little-known ele-

ment zirconium and welded to standards of almost unprecedented quality, embodied scores of innovations in design and manufacture. Rickover's decisions to use uranium oxide and zirconium in the fuel elements and slightly enriched rather than fully enriched uranium were made only after months of exacting research and testing that produced fundamental engineering data for the future. All these data, carefully summarized in thousands of technical reports, were openly available to engineers throughout the world as the plant was being built. Perhaps no other engineering undertaking in history had been so thoroughly documented. After the plant went into operation, Duquesne organized a series of public training courses in reactor safety and operation. Over the next six years, more than one hundred engineers and technicians from the United States and ten other countries learned the rudiments of reactor technology at Shippingport.³⁶

BUILDING A NUCLEAR NAVY

During this same period, from 1954 to late 1957, Rickover's accomplishments in the naval reactor project as well as at Shippingport were ultimately to have a profound impact on the fledgling nuclear industry in the United States. While Westinghouse was straining to complete the Shippingport plant, Rickover was bombarding both the Bettis and Knolls laboratories with new requirements for submarine propulsion systems. As Rickover had anticipated, the brilliant success of the *Nautilus* had caused the Navy to shift its long-range planning strongly in the direction of nuclear power, especially for submarines. By the end of 1955, Rickover was faced with formal military requirements that far exceeded the existing capacity of his laboratories and contractors.

In addition to work on Shippingport, Bettis began designs of a new reactor smaller and more compact than that in the *Nautilus*, the S3W and S4W, for a new class of small attack submarine. The *Skate*, the first ship in this class, had been launched and was nearing completion by the end of 1957. Bettis was also at work on a new and larger reactor, known as the S5W, which would become the standard propulsion plant for twenty attack and twenty-nine *Polaris* missile-launching submarines to be authorized by 1962. The core and most components of the first S5W were ready for assembly by late 1957. In addition, Bettis was required to develop reactors for the surface fleet. The AIW built at the Idaho test station was the prototype for a multiple-reactor installation in an aircraft carrier. The C1W and F1W were to be smaller versions intended for use in a guided missile cruiser and a frigate (large destroyer).³⁷

Likewise, General Electric scientists and engineers were engaged in several simultaneous development projects for naval propulsion systems. Knolls had cut its teeth on two sodium-cooled reactor plants, one a land-

based prototype at West Milton, New York, and the second the shipboard plant for the attack submarine *Seawolf*. In 1955, Knolls received a new requirement to develop a water-cooled prototype (S3G) and a propulsion plant (S4G) ultimately used in the radar-picket submarine *Triton*. When the *Seawolf* plant developed leaks during summer 1956, Rickover decided to replace it with a water-cooled reactor, and Knolls began to convert its staff entirely to water-cooled technology. Combustion Engineering was also using water cooling in designing a prototype of a small propulsion reactor for a hunter-killer submarine.

Thus, by 1957 the major reactor manufacturers in the Navy program were no longer engaged in elementary studies of reactor technology or the design of simple reactor plants. They were now exploiting the advantages of multiple development, which enabled them to incorporate in successive designs the knowledge and techniques learned in building the first generation of water reactors. This capability made it possible for Rickover's contractors, particularly Westinghouse at Bettis, to respond quickly with new designs for water reactors and to build them without relying on the costly and time-consuming construction of prototypes.

Navy requirements for large numbers of nuclear ships also made it possible for Rickover's group and the manufacturers to realize the advantages of multiple production. Once Bettis had built the first S5G plant and standardized the design, it was feasible to farm out the manufacture of components for additional S5G reactors to a large number of fabricators and suppliers. In taking these first steps in creating a true nuclear industry, Rickover's staff encountered unprecedented problems in obtaining qualified subcontractors, training them to accept the extraordinary standards imposed by the specifications as both attainable and necessary, and then assuring that quality control was effective. By 1957, the production of zirconium had been transformed from a specialized laboratory technique into a commercial process performed by independent companies at a fraction of the cost incurred in fabricating the first *Nautilus* core.

The demand for components had become so large in 1956 that Rickover ordered Bettis to establish an independent procurement organization, which negotiated contracts with suppliers and manufacturers and monitored performance. Rickover saw to it that Knolls had a similar organization some months later. Within a short time, most reactor cores for naval ships were coming from the plants of five commercial fabricators under fixed-price contracts. No private utility executive who complained to Strauss about Rickover's insulting and outrageous behavior acknowledged or even understood that he was slowly and painfully building a national network of suppliers and fabricators capable of producing equipment that met nuclear standards. While the Commission debated policy issues, Rickover and his staff forged the commercial infrastructure on which the future of the nuclear industry in the United States would depend.

STRAUSS'S LAST STAND

Early in December 1957, Strauss had in effect rejected all appeals for federal leadership and subsidy in building a nuclear power industry in the United States. On the thirteenth, Strauss told Eisenhower and the National Security Council that he still believed private industry would finance the development, without government assistance.³⁸ Under the circumstances, however, Strauss had no choice but to make at least a show of cooperation with the Joint Committee in devising a reactor program acceptable to both sides. He acceded to a request from Congressman Durham that the Commissioners meet on December 18 with the committee to discuss the opinions expressed at the recent industry meetings sponsored by both groups. Strauss did not attend the meetings himself, but he saw to it that all the other Commissioners and General Manager Kenneth Fields were present. In an effort to respond to repeated demands from industry for a clear-cut policy statement from the government, the two sides agreed on broadly stated objectives that would recognize the need for prompt achievement of competitive nuclear power at home, reassure the nation's allies of technical assistance to meet their power needs, strengthen the nation's position of leadership in the eyes of the world in the peaceful uses of atomic energy, and increase the nation's capacity for plutonium production by providing government assistance for building power reactors at home and abroad.³⁹

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Strauss could accept vaguely worded statements of intent such as these, but he had no thought of compromising on the specifics. His year-end summary of the Commission's accomplishments reiterated the usual long list of reactor projects, all set in a context of "progress." Zehring reported that the summary and a recent speech by Vance to utility executives in Chicago had done "more to encourage and stabilize views of the Company Presidents than any other events of the entire year." The source of encouragement was not the claim of accomplishment but the show of determination to avoid "large Government plant construction." The utility companies, Zehring reported, were reassured that the Administration policy would stay on the right track as long as Strauss served as chairman. Leaders of the industry had "already decided to plan a quiet and private campaign to keep Lewis Strauss on the A.E.C. job for another term."⁴⁰

Such expressions of confidence in Strauss were not misplaced; however, in succeeding weeks Strauss proved too doctrinaire and inflexible in his views to control Commission reactor policy. On Friday, January 31, 1958, the day before a scheduled conference with the Joint Committee, the Commission still had not been able to reach a consensus on the outlines of a reactor policy. Strauss, insisting that private industry was showing more inclination to invest in reactor projects, saw no need for a government-financed program. Commissioner Graham, speaking in blunt language seldom heard since Murray's departure, called for a realistic approach to the

political situation. Unless the Commissioners came up with specific proposals for the Saturday meeting, they would abdicate leadership in reactor development policy to Ramey and the Joint Committee. The committee was determined, Graham said, to see several new types of reactors constructed, and he urged the Commission to accept the inevitable. Strauss remained adamant that any new projects be undertaken within the power demonstration program. As consensus continued to elude them, Vance stepped into the breach. He reminded his colleagues that the final legislation on power reactor development would be written by the Joint Committee, not the Commission. As a compromise, Vance offered his own version of a Commission position.⁴¹

THE VANCE PROPOSAL

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For domestic purposes, Vance proposed that the Commission offer to continue to develop a number of reactor types, without focusing exclusively on water reactors, as Davis had recommended. On the need for more research on fuel elements, all were agreed. Following Davis's lead, the Commission would support design studies of improved water reactors. If these studies proved promising, the Commission would be prepared to build three prototypes—a large dual-purpose reactor for the production of plutonium or tritium and power, a moderate-size gas-cooled reactor, and a natural-uranium reactor—and additional test reactors, as Graham had proposed. As a concession to Strauss, the Commission would start construction only when convinced that private industry would not do the job. The Commission would also support construction of several small nuclear power plants at military bases overseas in cooperation with the Department of Defense.⁴²

To support the development of nuclear power abroad, Vance proposed a comprehensive array of technical assistance and training programs and research support for friendly nations. As he had advocated a year earlier, Vance also proposed that the Commission cooperate with EURATOM in placing four to six large water-cooled plants with an electrical capacity of one million kilowatts in operation by 1963. This effort, plus continued support of the Atoms-for-Peace program in areas other than nuclear power development, would maintain the United States' world leadership in nuclear energy. At the end of his proposal, Vance added a new item, which had come into consideration only in 1958: that the Commission be authorized to buy plutonium produced in power reactors at home and abroad for periods of up to ten years of reactor operation. The trend toward smaller weapons, particularly for missile warheads, and toward weapons with greatly reduced fallout would likely increase requirements for plutonium and tritium, which were then produced in large quantities only in the Commission's production reactors.

With only hours remaining before the meeting with the Joint Committee on Saturday, the Commissioners had little choice but to accept Vance's proposal. After a few minor changes on both Friday afternoon and Saturday morning, the Commission adopted Vance's draft. As a general statement of intentions, the draft proved acceptable to the Joint Committee, and Strauss finally transmitted it on Monday morning.⁴³

Although the plan seemed to mollify the Joint Committee, the Commission had no assurance that it could be effected. In attempting to comply with the President's ceiling for the 1959 budget, the Commission had severely pruned Davis's request for reactor development. In fact, the cuts had been so deep, for not only reactors but also production of nuclear materials and weapons, that the Commission was already considering a supplemental request that would have increased the proposed budget by almost one-third. Only the kind of psychological crisis created by *Sputnik* could have caused Eisenhower to relent in his determination to restrict federal expenditures. The Commission was not the only federal agency that saw in *Sputnik* an opportunity to recover some funding already pared from the budget.

A supplemental request, however, of about one billion dollars, half of which would be required to finance the new power reactor program, seemed far too large. As a tactical move, the Commission decided to exclude from its supplemental request any funding for the dual-purpose or gas-cooled reactors, on the grounds that the design studies mandated by the authorization act in 1957 had not yet been completed. If these studies, then being completed at Hanford, should conclude that the reactors were worth building, then the Commission might have to seek subsequent funding. Strauss explained all this in a letter to the Bureau of the Budget. Without mentioning the implied commitment to the Joint Committee to seek authorization for the two reactors, Strauss mentioned the informal discussions with the committee, and he added an admonition: "It is apparent that unless the Commission formulates and offers some program of acceleration it may be faced with a much larger program not of its own choosing."⁴⁴

HOLDING THE LINE

Under the circumstances, Strauss and his colleagues were not eager to have their informal agreement with the Joint Committee publicized, at least not until the Bureau of the Budget had acted on the supplemental request. For their own part, Ramey and members of the Joint Committee were perfectly willing to continue informal negotiations, which seemed to be producing better results than direct confrontations had in the past. Both parties therefore agreed that neither the informal meetings nor the draft plan would be discussed at the annual Section 202 hearings, which began on February 19. To this end, Congressman Durham announced that all discussions of

power reactors would be deferred until the end of the hearings. In his opening remarks, however, Strauss could not resist the temptation to report that a West Coast utility had just decided to build a large nuclear power plant with no federal contribution. Senator Anderson exploded at what he considered a breach of the agreement to postpone discussions of the subject. Strauss later reported to the President that "the announcement literally infuriated the public power advocates on the Committee." Unfortunately, Strauss admitted, unfavorable economic conditions were tempting some large companies to testify at the hearings in favor of government construction or subsidies. Strauss added: "It is making it a little harder to hold the line."⁴⁵

Strauss was indeed holding the line, but his unwillingness to compromise, even to the point of antagonizing his opponents, would cost him dearly. Early in February, in response to a discreet inquiry from the White House, Senate Majority Leader Lyndon B. Johnson saw no chance that Strauss could be reappointed without "a knock down, drag-out fight." Johnson reported,

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Some of my people are very upset about him. They consider him arrogant and resent his statements that they have tried to socialize the power industry through the use of nuclear reactors, whereas the Administration is represented as the only true friend of free enterprise in the field of power.

If Strauss behaved himself, Johnson predicted, Senator Anderson might still be able to squeeze through a new term for Strauss. But Strauss's performance at the Section 202 hearings twelve days later seemed to kill that possibility.⁴⁶

Despite Strauss's breach, both the Commission and the Joint Committee continued to try informally to resolve remaining differences that stood in the way of a single nuclear power policy for the government. As the next step, the Commissioners invited the committee members to an informal luncheon on February 24 to resolve the last two points of difference: Should industry be given a chance to submit demonstration proposals for the three new prototypes? And what should be the specific terms of the plutonium purchase contracts? On the first point, Ramey and the committee members feared that the offer to industry would delay the projects for at least a year. On the second, Congressman Holifield was reported as suspecting that Strauss had designed the plutonium purchase idea to help out some utility companies that were overcommitted to uneconomical reactor plants. Strauss proposed a four-month time limit for industry proposals, and Fields was given authority to negotiate terms of the plutonium contracts with Ramey.⁴⁷

By late March 1958, the remaining differences had been resolved to the satisfaction of both sides. The committee had accepted Strauss's insis-

tence that private industry be offered a chance to submit proposals for constructing the prototypes under liberalized provisions of the third round of the power demonstration program. For its part, the Commission had agreed to drop its request for authority to negotiate plutonium purchase contracts. Vance's original statement had now been elaborated to justify fully the Commission's stand against unrestrained government financing, and the statement now set forth the specific development projects for which the Commission would seek authorization. The broad objectives at the beginning of the paper for domestic and foreign development had now been made more specific by providing goals to achieve competitive nuclear power in the United States during the next ten years and in friendly nations in the next five years.⁴⁸

428 The agreement was not all that Strauss might have wanted. By admitting the need for the large prototypes, the Commission opened up the possibility that these might be built as government projects if private industry failed to take up the challenge. One way or another, however, Strauss had been able otherwise to retain the big features of the power demonstration program as a bulwark against unrestrained federal expenditures or subsidies.

Strauss and his colleagues also knew by this time that the Administration had no intention of approving most of the Commission's request for supplemental funding. They were astounded to learn early in April that the Bureau of the Budget had denied more than \$220 million in their request for almost \$260 million for reactor development projects. In the wide sweep of the budgetary scythe, the bureau had not only eliminated the proposed increase for the Commission's own power reactor projects and the Army package power reactors and cut the proposed estimate for fuel element studies by one-third, but it had also deleted all funding in fiscal year 1959 for the natural-uranium, the heavy-water, and the gas-cooled reactors, and for materials and test reactors. The third prototype, for which the Commission was already committed in its informal agreement with the Joint Committee, had not been included in the supplemental request. Because the Department of Defense refused to submit a formal requirement for additional production of plutonium and tritium, the Commission had refused to seek funding for the dual-purpose reactor.⁴⁹

Given Strauss's lack of enthusiasm for the prototypes, it is difficult to believe that he was really as surprised by the bureau's action as he pretended to be; but in his discussions with Maurice Stans, the new director of the bureau, Strauss did not lose sight of the political realities. He feared that eliminating all the prototypes might push the Joint Committee too far. If the gas-cooled reactor were approved, Strauss thought he might be able to head off a new version of the Gore-Holifield bill in the Congress. Eisenhower agreed to include the project in the authorization bill, but he directed that any appropriated funds be held in reserve by the Bureau of the Budget

until private industry had a chance to submit proposals to construct the reactor with private funds. In the version sent to the Joint Committee, the draft authorization bill amounted to only \$115 million: of that, \$88 million was earmarked for the Commission's own research and development work, including \$51 million for the gas-cooled reactor, and \$27 million for the power demonstration program.⁵⁰

Strauss could leave his post as chairman on June 30, 1958, with the satisfaction of knowing that he had stuck to his principles for five years through thick and thin. During his term as chairman, he had been able to thwart every effort by the Joint Committee and a Democratic Congress to enact a government-financed program to build nuclear power plants. In so doing, Strauss believed that he had successfully preserved for the private power industry what he saw as its traditional place in the American economy. For his considerable accomplishment Strauss had paid a heavy price, not only in terms of his personal career but also in mortgaging the future of the Commission. Strauss's determination to reserve the key decisions in nuclear power development to private industry excluded the Commission from exercising its role as an effective and active formulator of national policy. Prevented by Strauss from taking the initiative in the policy debate, the Commission appeared to defer first to industry, then to the Joint Committee, and finally to the Administration itself. However Strauss may have justified this strategy in his own mind, such actions of deference in the game of bureaucratic politics could only debase the Commission's prestige and authority as an independent agency of the federal government. In the process nuclear power had become a full-fledged political issue, and the Commission had lost the special status and advantage it had enjoyed since 1947.

CHAPTER 16

EURATOM AND THE INTERNATIONAL AGENCY, 1957–1958

The Atomic Energy Commission's role in setting America's nuclear power policy was complicated because much of the Atoms-for-Peace program required close coordination with the State Department and Congress. Another complication was that President Eisenhower insisted on personally monitoring the progress of Atoms-for-Peace negotiations and treaty making. EURATOM became a key element in Eisenhower's grand design for Europe. Following the precedent of the Marshall Plan, the President hoped Atoms for Peace would forge even stronger economic and technical bonds between Europe and North America. In this sense, the Administration's policy also stimulated foreign markets for American reactor manufacturers, who in the 1950s enjoyed only limited domestic prospects. As an instrument of American foreign policy, Atoms for Peace reflected Eisenhower's hope to promote international peace, prosperity, and security by providing an American atomic shield (NATO) behind which a coal-and-oil-poor Europe could establish nuclear-powered self-sufficiency through EURATOM.¹ To be sure, the International Atomic Energy Agency was important to American interests, but ultimately the Administration would place higher priority on European economic integration than on international cooperation on atomic energy. In the meantime, the second Geneva conference sponsored by the United Nations in summer 1958 gave the United States an opportunity to demonstrate its technical progress in developing the peaceful uses of nuclear energy.

THE PRESIDENT AND THE THREE WISE MEN

During their visit in February 1957, the Three Wise Men from EURATOM met with Eisenhower, who was attended by Strauss but not by Dulles. The

President, however, shared with his visitors Dulles's ambitions for European economic solidarity. Recalling his vision of a united Europe as a third great force in the world, Eisenhower told the Wise Men that European nations had to learn the Biblical precept that to save their lives they must lose them. If the European nations did not join together, Eisenhower warned, "deterioration and ultimate disaster were inevitable." Offering the Wise Men his full support, Eisenhower asked Strauss whether the United States could supply sufficient enriched material to support the proposed EURATOM program. Without answering the President directly, Strauss replied that this matter posed a considerable problem because the projected needs of the EURATOM group were very large. Nevertheless, Strauss thought the Commission could guarantee delivery "for a very great deal" of what EURATOM needed.²

Undoubtedly still smarting from his earlier confrontation with Dulles over bilateral agreements, Strauss reluctantly concurred in the joint communiqué issued by the Department of State, the Commission, and the EURATOM committee. Despite his vague assurances to Eisenhower, however, Strauss would not offer the Wise Men an unqualified commitment to supply EURATOM with enriched fuel. At a luncheon with the Wise Men, Strauss had pointed out that the availability of nuclear fuels ought not be a limiting factor, provided the supplies of raw materials continued adequate and provided the requirements of the Defense Department for fissionable materials did not absorb too large a share of America's total production. But Strauss also made it absolutely clear to the Wise Men that the Commission's first responsibility was to supply the needs of the United States military, which were essential for the defense of not only North America but also the entire free world.³ As far as Strauss was concerned, Atoms for Peace would not take precedence over Atoms for War.

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THE BRUSSELS TASK FORCE

Nevertheless, the Commission agreed to dispatch a task force of American experts to Brussels to offer technical and financial assistance to the Wise Men, who were preparing their final report to EURATOM. Arriving in Luxembourg on March 24, 1957, the staff members led by Richard W. Cook, deputy general manager, joined the work in progress, contributing principally to the section of the Wise Men's report dealing with "Nuclear Power Prospects."⁴ The Commission group, working alongside a similar delegation from the United Kingdom, focused its attention on the feasibility of EURATOM's long-range plan, the projected estimated costs of nuclear power compared to conventional power, and the availability of enriched uranium fuel. The consensus among the Americans was that EURATOM's goal of 15,000 megawatts of nuclear power capacity by 1968 was overly

optimistic but not impossible, especially if the Europeans purchased American light-water reactors and British gas reactors.⁵

The Commission experts also estimated that large European nuclear power plants could provide competitive power, excluding research and development costs, at a cost of eleven to fourteen mills per kilowatt-hour over the life of the plants with earlier costs high and later costs low. The Americans believed that fuel would be adequate, especially in view of the natural uranium available in France and the Belgian Congo and the Canadian government's assurances to the Wise Men. The American delegation returned to the United States hopeful of EURATOM's future and confident that the EURATOM treaty, which had been signed in Rome along with the Common Market Agreement on March 25, would be quickly ratified by participating governments.⁶

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THE EURATOM TREATY

The Commission offered no serious objections to the draft EURATOM treaty, which Paul-Henri Spaak sent to Washington for comments in April 1957. Speaking for his colleagues, Strauss noted that the Commission could not assure Spaak that there were no provisions in the treaty inimical to the relationship between the United States and EURATOM. Only experience and subsequent interpretation of the treaty could settle that question. The Commission was worried that the EURATOM agreement would permit member states to manufacture nuclear weapons. Murray endorsed a suggestion that all uranium-producing countries, such as the United States, Canada, and South Africa, require that uranium sold to EURATOM not be used in weapons. Despite the increasing availability of uranium, the Commission was also reluctant to release Belgium from its commitments to supply the United States with uranium concentrates through 1960. Spaak asked for this concession specifically because EURATOM's hopes for expansion rested in part upon Belgian Congo uranium resources. Again Strauss and the Commission relinquished the United States' options on Congo ore only under severe pressure from the State Department.⁷

SURPRISE ATTACK FROM THE SENATE

United States participation in the International Atomic Energy Agency, not support of EURATOM, became the major issue before the Senate in 1957. Preoccupied by the EURATOM discussions, the Eisenhower Administration was caught by surprise when conservative Senate Republicans threatened to undermine American leadership of Atoms for Peace by challenging the United States' ratification of the statute of the International Atomic

Energy Agency. Adopted on October 26, 1956, at the eighty-one nation conference in New York, the statute became the key issue in the President's State of the Union message when he cited it as a demonstration of his "unalterable purpose to make of the atom a peaceful servant of humanity."⁸ Unknown to the President, the Commission had already received a hint of the trouble ahead.

The day before the State of the Union message, Strauss learned that four influential senators held serious reservations concerning the International Atomic Energy Agency.⁹ What Strauss did not know was that a campaign against ratification of the treaty had been gathering momentum since December 1956 when letters soliciting opposition to the "President's fantastic Atomic Energy giveaway plan" were sent to members of Congress, leading newspaper publishers, the National Association of Manufacturers, and the American Legion. At first the campaign against the treaty was conducted almost single-handedly by David S. Teeple, a disgruntled former deputy director of the Joint Committee and subsequent assistant to Strauss. Teeple had resigned as Strauss's aide in 1954 after protesting against "left-wing" advisers surrounding the chairman. He then carried his fight to the pages of the *National Review*, where he questioned the motives of the President, Strauss, and Dulles in sponsoring United States membership in an organization he thought contrary to national interests.¹⁰

Thereafter, opposition to the treaty mushroomed alarmingly. In a Lincoln Day speech written by Teeple, Senator Joseph McCarthy blasted the Administration for its plans to "give away" through the International Atomic Energy Agency sufficient enriched uranium to build 2,200 atomic bombs, which could "wipe every major American city off the map." McCarthy, who would die before the treaty was debated by the Senate, ultimately proved no threat. On the other hand, Senators Bricker, Knowland, and Hickenlooper, also assisted by Teeple, were reported to have fundamental objections to the statute, which Senator Pastore cautioned would have to be modified if the treaty were to have any chance of ratification. Within two weeks of Eisenhower's submitting the statute to the Senate, Teeple gloated that he had talked to at least twenty-two senators, and possibly thirty-six, who would vote against the statute. Indirectly, Pastore confirmed this gloomy estimate by warning that it was almost too late to save the statute unless the President appeared personally before the Senate to plead his case.¹¹

The objections raised by the statute's critics, as Eisenhower well knew, were varied and often ill-defined. Hickenlooper presented Under Secretary of State Christian Herter with a booklet of questions prepared by Teeple and endorsed by Knowland.¹² With the President and Herter, Strauss reviewed the major challenges raised against the statute: the People's Republic of China might be admitted to the agency; American nuclear material would be shipped to the Russians or their allies; third

world countries would be enabled to develop atomic weapons; the agency was not necessary because the United States had bilateral cooperation agreements; and the statute, once ratified, could be amended to include provisions adverse to American interests. No challenge was insurmountable, but Eisenhower's advisers agreed that the President would have to meet personally with Knowland and Hickenlooper, members of both the Foreign Relations Committee and the Joint Committee on Atomic Energy, if a bitter fight over the statute was to be avoided. Because the President had committed his personal prestige to the International Atomic Energy Agency, an American failure to ratify, or even a close Senate vote, would severely damage Eisenhower's political standing with immeasurable after-effects.¹³

Embarrassment touched close enough on May 2, 1957, when Washington learned that the Soviet Union had already ratified the statute even before the Senate had begun its official consideration of United States membership. Not only had the Soviet Union successfully stolen the march on the United States, but it began to appear that the Eisenhower Administration could sell the program to every government but its own. According to the *New York Times*, Senate opposition to the international agency sprang mostly from a complex crosscurrent of isolationist, anti-foreign aid, anti-communist, and military-secrecy sentiments. There was, however, a new and unrelated current of uncertain strength—opposition from liberal Democrats to both the Administration's domestic power reactor program and the leadership of the Atomic Energy Commission. Although Senator Pastore provided invaluable intelligence and support, the Administration was hampered by the lack of strong proponents on the Republican side of the Senate. The danger was not so much that the statute would be rejected outright, but that without support from Knowland and Hickenlooper it would be encumbered with reservations that would make United States participation in the international agency impossible.¹⁴

Ultimately, the reservations proposed by the statute's critics were narrowed to two. Less damaging than a similar reservation offered by Bricker, Knowland demanded that all amendments to the statute be ratified by the Senate before becoming binding on the United States. More drastically, Bricker would have required the United States to withdraw from the agency in the event the Senate rejected an amendment to the statute. Bricker's unfortunate reservation would have emphasized withdrawal from the agency as a primary American concern and no doubt would have stimulated other countries to raise similar reservations. Nevertheless, some such caveat seemed to be the price for Senate support, and the Administration accepted the Knowland version, which simply stated that "the authority of the United States to participate in the IAEA would be terminated" should the Senate refuse to endorse an amendment to the statute.¹⁵

Potentially more damaging was Bricker's second reservation that

modified the provisions of the 1954 Atomic Energy Act authorizing the transfer of United States nuclear material to the agency. Despite the fact that he was author of Section 124 governing the transfer of nuclear materials to groups of nations, Bricker was so fearful of communist nations obtaining American enriched uranium that he wanted to require Congressional approval of all transfers of nuclear materials to the international agency. In effect, Bricker proposed to cancel Section 124 as it applied to the agency and substitute direct Congressional oversight. Although the Administration successfully beat back the amendment during debate over the statute, Bricker's reservation was finally accepted by the conference committee, which approved the IAEA Participation Act following ratification of the statute on July 29, 1957. Because the act signed on August 28 granted the international agency 5,000 kilograms of enriched uranium and promised to match the contributions of all other member countries until July 1960, the Administration could swallow the Bricker proviso. It launched America's participation on a sour note, however, and created concern that the United States would be handicapped in competing against British manufactured fuel. With United States contributions dependent upon unpredictable Congressional action, *Business Week* suggested that foreign governments might well pass up the American-made reactor in favor of the British gas-cooled reactor, which did not depend on enriched uranium.¹⁶

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LAUNCHING THE INTERNATIONAL AGENCY

Having secured Congressional support for the International Atomic Energy Agency, the Commission and the State Department could focus their attention on preparations for the first general conference scheduled to convene in Vienna on October 1, 1957. Almost four years after Eisenhower's hopeful address to the United Nations, the fifty-two delegations gathered with optimism tempered by the anniversary of the Hungarian uprising and the Suez crisis. Although the United States was recognized as the instigator and leader of the conference, racial strife in Little Rock, the decline of the stock market, and the launching of *Sputnik* had tarnished America's reputation. If developing countries had overestimated the benefits from the peaceful atom and underestimated the time needed to gain them, the United States had underestimated the difficulties in organizing the International Atomic Energy Agency. As others have noted, the structure of the agency, with its balanced board of governors and limited authority for the director general, was obviously designed to protect the interests of the principal nuclear powers.¹⁷ All in all, the climate at the opening of the conference was not as favorable as it had been when Eisenhower first presented his Atoms-for-Peace proposal in 1953.

The American delegation to Vienna was headed by Robert McKinney, who replaced James J. Wadsworth on the preparatory commission in anticipation of the conference. McKinney had had no prior diplomatic experience, but he had earned the confidence of the Senate Democratic leadership for his services to Senator Anderson. According to Strauss, Senator Lyndon B. Johnson, who wanted to be the "Vandenberg of the Eisenhower Administration" by stressing bipartisan peaceful atomic diplomacy, requested some kind of atomic appointment for McKinney. Almost certainly Johnson had in mind a Commission appointment to replace Murray, upon whom the Congressional Democrats could no longer rely. Horrified at the thought of one of Anderson's associates sitting beside him on the Commission, Strauss speculated that McKinney would not want to divest himself of his International Telephone and Telegraph interests in order to secure a Commission appointment. As an alternative, Strauss suggested that McKinney might be interested in leading the United States delegation to the international agency. With Herter's permission, Strauss made all the arrangements, recruited McKinney, and cleared the appointment with Johnson and Anderson personally. From Strauss's point of view, the appointment solved two problems at once: it blocked McKinney from a seat on the Commission while it gained powerful senatorial allies for the President's program. Strauss's only trouble came from the President himself, who was understandably miffed at the appointment of a Democrat who had personally attacked him during the 1956 campaign. Thus, political considerations not only sent an inexperienced diplomat to Vienna but also dictated the selection of a delegation chairman in whom the Administration was unlikely to place much confidence.¹⁸

STAFFING AND SUPPORTING THE AGENCY

Even more inauspicious for inaugurating the International Atomic Energy Agency was American insistence that a United States national be selected to head the agency. Once again, political considerations forced the Americans to demand this concession from the surprised conference, which had expected the United States to honor the tacit agreement that the director general would come from a neutral country. In part, trouble came from the Senate where Knowland, reasoning that the United States might be the only country to contribute significant amounts of nuclear materials to the agency, suggested that the board of governors, if dominated by representatives from unfriendly countries, might distribute American uranium behind the Iron Curtain or to other unfriendly areas. Not only was it essential that the agency exercise tight safeguards, Knowland contended, but it was equally important to know who was going to be director general.¹⁹

On this issue, Knowland had allies in the Administration. As early

as September 1956, Strauss had considered seriously the possibility of recruiting W. Sterling Cole for the position. Although the President and Dulles did not want Strauss to "push" for an American appointment, neither did they categorically oppose the idea. As Strauss explained to Dulles, no one other than Cole could provide so much assurance of Congressional support during the first critical years of the agency.²⁰

The United States first hinted to the Soviet Union that it wanted an American as director general on March 29, 1957, but it was not until June 14 that Wadsworth formally broached the matter to Vasily S. Emelyanov, the Soviet delegate to the agency. The Soviets had expected to support the representative of a neutral country for the position, and they would not agree to discuss the American appointment separately from other positions in the agency. The Americans, hoping to strike a deal, suggested that a Soviet national might serve as the deputy director general for training and technical assistance. It became clear that the the United States would have to pay a price to obtain an American director general. The Soviet side indicated, however, that it would also ask for other positions for Soviet nationals.²¹

Piqued at having to haggle with the Russians over jobs, Eisenhower told Strauss to make no deals until the Soviet Union had contributed its share of fissionable materials to the international agency. Wadsworth was instructed to inform the Russians that the United States intended to sponsor Cole for director general but that further discussions of staffing would have to await Soviet contribution of enriched uranium. The implication was plain: Eisenhower would concede to the Russians only a level of representation appropriate to the amount of nuclear material the Soviet Union made available to the new agency.²²

Ultimately, Strauss was given the assignment to recruit Cole, who after twelve terms in the House of Representatives was understandably reluctant to give up his safe seat for an uncertain tenure in Vienna. Nevertheless, because Cole was popular in the Congress, acceptable to the British, and unobjectionable to the Soviet Union, Strauss persuaded him to serve by appealing to Cole's patriotic sense of duty while offering a salary and perquisites second only to the secretary general of the United Nations. Later Cole would have second thoughts about his decision, but on the eve of the first general conference he believed the International Atomic Energy Agency would become as important as the International Bank, collecting, holding, and distributing nuclear material similar to the way the bank handled international funds.²³

Notwithstanding the Administration's stance on placing Soviet nationals in operating positions, McKinney recognized that, if the Soviets were going to participate in the agency, the United States could not expect to isolate them entirely from positions of importance, especially given the technical strength of the Soviet mission in comparison with the delegations

of the Western nations. Unless the United States matched the Soviet Union with a strong countervailing technical staff, McKinney feared the Russians would take full advantage of the vacuum created by the fact that NATO countries had sought mainly administrative posts.²⁴

In further support of the agency, the Commission approved offering an unclassified technical library, a research reactor, and a radioisotope laboratory to the agency. Additionally, the Commission agreed to provide the agency free consultant services, to train 120 agency-selected fellows, to equip two mobile radioisotope training laboratories, and to assist the agency in its recruiting efforts by recommending fifty-four scientists and technicians. The total cost of the American contributions through 1959 would be \$3,154,000. Finally, the Commission approved policies relating to the transfer of source and special nuclear materials to the agency. Financial assistance to the agency, however, was contingent upon the outcome of negotiations that were concurrently being conducted with EURATOM.²⁵

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REDEFINING ATOMS FOR PEACE

Back in April 1957, the Commission and the State Department had submitted their joint progress report on implementing the National Security Council memorandum on "Peaceful Uses of Atomic Energy." Although the State Department reportedly considered writing its own report to offset the Commission's optimism, officially the two agencies expressed general satisfaction with the progress made in the Atoms-for-Peace program. Only Commissioner Murray, who favored immediate construction of large power reactors, publicly criticized the Commission's programs and policies in a separate opinion.²⁶ Taking note of the failure to make substantial progress with disarmament, the report nevertheless emphasized that the most significant achievement of the United States might have been in developing "an awareness of the vital necessity for international control over the peaceful uses of atomic energy" and in taking the first steps toward devising an acceptable safeguard system, especially as envisioned in the bilateral agreements. Yet, while the agency statute had established a broad safeguard policy, an effective multilateral control system had yet to be devised. In fact, because the United States had not yet shipped sizeable quantities of enriched materials to any country, the practical matter of implementing the safeguard provisions of the bilaterals still had to be resolved. Indeed, the initial policy of the National Security Council had sought only to prevent diversion of materials contributed by the United States, without anticipating the need to control fissionable by-products such as plutonium as well.

The Commission and the State Department agreed that the United States' original Atoms-for-Peace policy adopted in March 1955 had become

obsolete. Since that time the United States had negotiated forty-three bilateral agreements of cooperation, sponsored the establishment of the international agency, and anticipated the ratification of the EURATOM community. In addition, the Organization for European Economic Cooperation, the Organization of American States, and the Colombo Plan nations in Asia had shown an interest in atomic energy. Both the Soviet Union and the United Kingdom had emerged as potential competitors with American industry in the field of nuclear power just when the need for alternative sources of power based on Middle Eastern oil had been demonstrated by the Suez crisis. Finally, as a matter of national policy, it became imperative to state unequivocally that projected national and regional nuclear power programs would increase the potential danger of nuclear weapon proliferation and radiation hazards.

Revision of the National Security Council's peaceful uses paper in autumn 1957 did not result in a major shift in American policy. Recognizing that the economics of nuclear power were not yet favorable in the United States and that large-scale development would proceed first in England and Europe, followed closely by Japan and the Soviet Union, the United States remained determined to maintain American supremacy in peaceful uses of atomic energy overseas and in nuclear technology, both in fact and in the eyes of the world. As long as the United States was regarded as the leading country in the field, friendly competition would not detract from that pre-eminence, which enhanced general acceptance of effective safeguards. Thus, the National Security Council concluded that loss of American pre-eminence in peaceful uses would damage not only the prestige but also the security of the United States.²⁷

Perhaps most important, the revised National Security Council policy stressed the need to establish a safeguard system under the aegis of the International Atomic Energy Agency. To this end the Administration would try to persuade other governments to accept the international safeguard provisions in the agreements for cooperation, including the stationing of resident inspection teams at the larger and more complex installations. The council, however, rejected a State Department proposal to place certain United States nonmilitary atomic energy facilities under the inspection system of the international agency, provided the Russians and the British would do the same.²⁸

EURATOM PRIORITIES

Even as the Administration debated the new policy, Soviet *Sputniks* challenged American scientific and technical pre-eminence and created even greater political imperatives for the success of the Atoms-for-Peace initiative. According to the State Department, Russian scientific and engineering

accomplishments had prompted the Atlantic community's serious and healthy reappraisal of the strength of Western technology. With Europeans wondering whether the United States would maintain its scientific and technical leadership in the space age, Douglas Dillon, Under Secretary of State for Economic Affairs, argued that the United States should exploit its nuclear capabilities as a rightful bellwether of scientific and industrial accomplishment.²⁹

By spring 1958, however, United States support for EURATOM as a symbol of nuclear cooperation and a vehicle for Western European economic integration had proven incompatible with the American objective of sponsoring the International Atomic Energy Agency with broad safeguarding responsibility. Well before the Treaty of Rome established EURATOM on January 1, 1958, it was evident that the United States would have to choose between divergent foreign policy objectives. For John Foster Dulles and the State Department, European stability demanded that EURATOM be given priority over the international agency, should American policy toward the two organizations conflict. The fall of the Gaillard government in France in May 1958 and the assumption of power by Charles de Gaulle emphasized all the more, Christian Herter wrote to Strauss, "the need to build a strong, cohesive and responsible unit in Western Europe through economic integration."³⁰

On January 28, 1958, the Commission and the State Department informed the President of their interest in developing a joint program with EURATOM that would bring on-line by 1963 about one million electric kilowatts of installed nuclear capacity. In comparison to the modest contributions to the international agency, the Commission anticipated providing to the EURATOM project long-term loans of up to \$150 million, or more than one-third of the total capital cost, excluding fuel. To sweeten the pot, the United States also proposed to contribute \$50 million in matching funds to EURATOM's research and development program. With presidential approval on February 6, a working party was established to negotiate a United States-EURATOM cooperative agreement.³¹

SAFEGUARDS FOR EURATOM

Not surprisingly, two of the most serious concerns for the United States were safeguards and fuel-cycle guarantees. Safeguards created the greatest difficulty for American foreign policy, and fuel-cycle guarantees touched off further domestic political debates about the Atoms-for-Peace "give-away." Of the two, the safeguard question was by far the more serious.

Recognizing the sensitivity of the issue prior to discussions with EURATOM representatives on March 20 in Luxembourg, Richard Cook, the leader of the American delegation to Brussels, suggested four alterna-

tives: (1) requiring EURATOM to accept the safeguard provisions normally included in bilateral agreements, (2) sharing safeguard administration and inspection with EURATOM on a joint basis, (3) seeking the same rights accorded in normal bilateral agreements but delegating partial responsibility for enforcement to EURATOM, or (4) foregoing expectations that EURATOM would conform to the Commission's normal safeguard requirements while acceding to European desires. According to the Commission staff, the first alternative was not politically feasible, and the last would represent an unacceptable reversal of United States policy. The State Department asked the Commission to authorize the American delegates to explore a compromise. For its part the Commission was willing to enter an agreement "which would recognize the supra-national position of EURATOM," provided the United States received assurances that no special nuclear material transferred to EURATOM would be used for military purposes.³²

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Although the EURATOM commission was willing to give the United States firm guarantees that all material, equipment, or devices provided by the United States would be used for nonmilitary purposes, the Europeans remained adamantly opposed to granting inspection rights to the United States or to any other country. The EURATOM commissioners stated their intention of granting United States representatives complete de facto access to facilities under the joint program, but they would not invest de jure inspection rights in any country outside the community. In short, the EURATOM commission did not think it should be treated less favorably than Canada and the United Kingdom with regard to safeguards and controls.³³

The Commission was extremely reluctant to compromise on the safeguard issue. Although Cook had warned that there would probably be no agreement if the United States insisted on inspection rights, Commissioner Libby observed that any departure from normal safeguard requirements might well undermine existing bilateral agreements. Strauss also expressed his concern that in assisting EURATOM the United States might well weaken the International Atomic Energy Agency. He suggested that Cole be informally briefed in Vienna on the proposed EURATOM cooperation program before the Commission made its final decision. Commissioner Vance noted that Max Kohnstamm, chairman of the EURATOM commission, would shortly be conferring with the Commissioners in Washington. At that time, Vance recommended informing Kohnstamm that the United States had not changed its position on safeguards. Vance believed there was a "slight chance" that the Europeans might compromise, but even if they did not the delay would not seriously disrupt the program.³⁴

On April 29, 1958, Kohnstamm left the Commission no doubt that EURATOM would not accept safeguard provisions imposed by a third party. He stressed the importance EURATOM placed on equality with the

United States and the need for a single international safeguard system operated by EURATOM without participation of the United States or any other non-EURATOM country, including the international agency. Although not exactly an ultimatum, Kohnstamm made it clear that EURATOM would not submit to inspections unacceptable to the United States, the United Kingdom, or the Soviet Union.³⁵

Later that same day, the Commission reconsidered safeguards. Anticipating Kohnstamm's visit, the staff had recommended that the Commission accept EURATOM's determination to establish its own safeguard system with American assistance. Under the revised proposal, cooperation between the United States and EURATOM would depend on EURATOM's establishing and maintaining a mutually satisfactory and effective system, which the United States could review from time to time.³⁶ Strauss with Commission support favored this recommendation on the understanding that if the EURATOM system ultimately failed to meet Commission standards, American assistance would be terminated. Following the chairman's request that Cole be informed of developments, the Commission approved in principle the compromise on the EURATOM safeguard system.³⁷

REACTIONS FROM VIENNA

Strauss's concern about the reaction of the international agency to the United States-EURATOM arrangement proved well founded. Even before Cook could reach Cole, the American Embassy in Vienna cabled its alarm to the State Department. Noting the distress of both Cole and McKinney, the dispatch also outlined the consternation of other Western nations, which reportedly agreed that the Soviet bloc would never permit the establishment of effective international controls under the agency if EURATOM were allowed to establish its own system. Separately, the American and some other representatives were said to fear the creation of multisafeguard systems, with the most lenient dominating, should the EURATOM position prevail.³⁸

Cook's attempt to mollify Cole failed utterly. On May 12, Cole expressed his dismay to Strauss. Thereafter, on May 18, he wrote directly to the President conveying essentially the same opinions. Defining the EURATOM safeguard proposal as "self-inspection," Cole predicted that such an arrangement would have "serious consequences on the effectiveness of the Agency" and strongly recommended to the President "that the safeguards or accountability aspects of EURATOM be assigned to the Agency."³⁹

Independently, and far more bluntly, McKinney warned Acting Secretary of State Herter that, unless some compromise were reached between EURATOM and the agency, "we might just as well consider the IAEA

finished and its basic purpose destroyed, along with the entire Atoms-for-Peace program which we initiated in 1953." Should the United States default on its leadership, as McKinney interpreted it, the Soviet Union stood ready to take over the leading role in the agency.⁴⁰

The State Department had now begun to show mounting concern over the safeguard issue, which threatened to delay or even scuttle the agreement for cooperation with EURATOM at the moment the United States faced a critical political situation in Europe. On the one hand, the American diplomats wanted to seize an opportunity to encourage European integration while at the same time helping to free Europe from the uncertainties of Middle Eastern oil. On the other hand, in view of de Gaulle's lack of enthusiasm for the integration movement, any procrastination by the United States in supporting EURATOM would surely be interpreted as evidence of American disinterest in European unity. In a personal letter, Dulles urged Strauss's support so that the matter could be expedited for presidential approval. In deference to Strauss's loyalty to Cole, Herter agreed to discuss the matter directly with the two men if Cole could return from Vienna.⁴¹

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At their decisive meeting on June 6, Cole began by stating his belief that EURATOM should not be permitted the right of self-inspection. Strauss agreed, stating that self-inspection by EURATOM would not only undermine the agency but also encourage other nations to form regional groups in order to secure immunity from international inspection. Herter searched for a compromise. Would it be possible, he asked, for Strauss to draft a letter to be sent by EURATOM to Dulles outlining American rights to verify that the EURATOM inspection system was working properly "by counting, weighing, assaying, etc.," the special nuclear material provided by the United States and the material derived from it? In addition, EURATOM would pledge to accept inspection by the agency, "if and when an international nuclear inspection system is agreed upon." Although Cole did not agree to Herter's proposal, neither did he object. When Strauss reported the meeting later to the Commission, Libby argued that EURATOM should accept inspection from either the United States or the agency, but Floberg advocated comprehensive United States inspection. Despite these reservations, Floberg agreed to draft the letter.⁴²

Two days later, the *New York Times* accused the Commission of raising "last-minute objections" to the proposed EURATOM agreement, thereby jeopardizing, according to State Department and EURATOM officials, "the whole European movement toward economic and political unity." Although dismayed at the disturbing lack of coordination between the Commission and the State Department, the following day the *Times* editorially supported the Commission's position. The *Times* commented that if EURATOM were to establish the precedent of "self-inspection," the Soviet bloc could well establish a similar organization.⁴³

The *Times* revelation of internal American disagreements proved

embarrassing, but it may also have prodded all parties to resolve their differences. On the day the editorial appeared, Strauss assured the impatient President that a compromise could be struck. Herter, Strauss, Floberg, Cole, McKinney, and Philip J. Farley, who had succeeded Smith as special assistant to the Secretary of State for atomic energy matters, then met to hammer out a draft memorandum acceptable to everyone. With minor changes, including allowing EURATOM to assure itself that plutonium coming back to the United States would be used only for peaceful purposes, Herter conducted direct negotiations with Kohnstamm. By June 11, the Commission, the State Department, Cole, and Kohnstamm for EURATOM all accepted the same draft memorandum on safeguards, clearing the way for the Commission's approval of the agreement for cooperation the following day. The program was subsequently approved by the President on June 17, 1958.⁴⁴

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Thus, EURATOM had successfully maintained its refusal to submit to an externally administered safeguard system. The United States in pursuing its first priority in peaceful atomic diplomacy had been obliged to accept a system that included the right to audit but whose ultimate sanction would merely allow the United States to terminate the cooperative program if it were not satisfied that safeguards were effectively maintained. Verification of safeguard adequacy would be obtained by "mutually approved scientific methods" during "frequent consultations and exchanges of visits." And should the agency establish an international safeguard and control system, the United States and EURATOM would "consult" to arrange the agency's assumption of the safeguard responsibility. In Western Europe, therefore, where the Atomic Energy Commission would foster the first large-scale nuclear power generating facilities outside North America, the United States had failed either to establish unilateral inspection rights such as those included in the bilateral agreements for power reactors or to devise effective sanctions other than noncooperation with countries that violated safeguard undertakings.⁴⁵

CONGRESSIONAL APPROVAL

The safeguard issue, the source of so much difficulty in the international negotiations, raised few questions when the EURATOM agreement was sent to Congress for approval. The draft agreement, however, could not be sent to the Joint Committee until June 23, 1958, and the delay threatened loss of action in the rush of last-minute legislation. The Administration was confident that, once the EURATOM agreement cleared the Joint Committee, Congressional approval would be forthcoming. The key to the Joint Committee was Senator Anderson, whose personal feud with Strauss seemed to threaten the possibility of swift action.

In fact, Anderson virtually ignored safeguards but bore down instead on the financial aspects of the joint program. In order to minimize the economic uncertainties associated with the nuclear fuel cycle, the United States had offered EURATOM guaranteed pricing on both fuel fabrication and reprocessing as well as low interest loans. Anderson was reported to be skeptical of EURATOM's financial reliability and suspicious that the EURATOM agreement would be used to "bail out" Italian nuclear projects presumably in financial trouble. Raising a procedural question, Anderson wondered why the terms and conditions of the loan had not been negotiated before the program was submitted to Congress for approval. Besides Anderson, however, there was no concerted Congressional opposition to the program.⁴⁶

Anderson's truculence no doubt reflected some of the exceedingly bad relations that existed between the Joint Committee and the Commission at that time. According to a State Department observer, the EURATOM proposal was sent to the committee at the very time the members had been infuriated by the treatment the Administration had given to the Joint Committee's unanimous recommendation pertaining to the domestic nuclear power program. Consequently, the committee members seemed so distrustful of the Commission that they were unwilling to accept the draft agreement as the best that could be negotiated in the time available; but instead, they looked upon it with suspicion that construed general provisions as an attempt to hide the details from the committee. Thus, the Administration regarded Anderson's expressed skepticism about the community's financial integrity and its political responsibility as secondary to his deep suspicion of the Commission and the Administration. In effect, the Administration won the substance of victory with none of its flavor.⁴⁷

THE SECOND GENEVA CONFERENCE

The second conference on the peaceful uses of atomic energy, which convened in Geneva on September 1, 1958, symbolically marked the culmination of Eisenhower's Atoms-for-Peace program. The conference was the largest scientific gathering of its kind ever assembled, Strauss noted afterward; he reported to the Secretary of State,

One cannot examine the statistics of this Conference and the tons of technical papers, reports, transcripts, photographs, newspaper articles, magazine stories which it generated, without becoming aware of the fact that atomic energy has now become part of the fabric of our civilization.⁴⁸

For years thereafter participants would remember the pride and excitement Americans shared at the conference. Yet, despite its great success

as an international scientific convention and fair, the conference did not chart a clear course for developing nuclear technology. For Strauss, Geneva provided a final hour of celebration before his humiliating failure to win Senate confirmation as Secretary of Commerce. Among old-timers "Geneva '58" became a watchword for the heyday of the Atomic Energy Commission.

Just in statistical terms alone, American participation at Geneva overwhelmed that of all other nations. The United States exhibit occupied 36,000 of the 75,000 square feet of space utilized by the twenty participating nations, and, in substance, clearly surpassed all other exhibits. For the most part the displays of other nations used panels, photographs, models, and static displays of laboratory equipment; the United States exhibit featured full-size operating laboratories, including experimental devices, two research and training reactors, a radioisotope laboratory, a hydrogen bubble chamber, a whole-body radiation counter, and seven experimental working devices for research on controlled thermonuclear reactions. The exhibit was manned by nearly two hundred leading scientists and technicians from American laboratories, hospitals, and universities. Some scientists actually assembled portions of their laboratories and carried forward their experiments under the observation of foreign colleagues. It was common to find scientists from different nations engaged in animated conversation at blackboards around the exhibit hall. Not all the 100,000 visitors to the United States exhibit were scientists, and many people were counted more than once as they returned again and again to study the displays.⁴⁹

The 572-member United States delegation, a virtual who's who of the nuclear community, was headed by Strauss and included other official representatives: Libby as vice-chairman, James R. Killian, Jr., chairman of the President's Science Advisory Committee, McKinney, and Isidor Rabi. American scientists contributed more than one-third of the 2,135 papers submitted to the conference and gave 231 of the 722 papers selected for oral presentation.⁵⁰ The United States also supplied seventeen of the fifty-one technical films presented by the United Nations and showed another twenty-eight short films on specialized subjects in four small theaters incorporated into the United States exhibit. At the Technical Information Center, located adjacent to the delegates' lounge on a specially constructed balcony, the United States distributed over 30,000 copies of technical literature.

The spectacular American show, set up in the shadow of *Sputnik*, which dominated the Soviet exhibit, was designed to demonstrate unqualified American leadership and preeminence in the nuclear field. From its inception in August 1955, when Strauss heard that the British were going to propose a second international conference and obtained the President's approval to "beat them to it," the second Geneva conference was destined to become an American extravaganza. Because of commitments to organize atomic energy exhibits for the Brussels World's Fair in 1958, Britain,

France, Italy, Belgium, and the Netherlands had all favored a more restrictive conference focusing on the problems of the International Atomic Energy Agency or confined to the theoretical and practical problems involved in the development of nuclear power. Americans serving on the secretary general's advisory committee accepted the idea that emphasis be placed on nuclear power, which would highlight American technology, but Ambassador Wadsworth also insisted that the agenda should be broad enough to include applications of atomic energy in industry, agriculture, and medicine.⁵¹

By mid-summer 1957, the Commission had decided to feature two special exhibits chosen as much for their propaganda value as for their scientific merit. In a technical tour de force, Argonne National Laboratory transported to Geneva an Argonaut training and research reactor that was assembled during the conference while delegates looked on as "side-walk superintendents." On the sixth day, Strauss brought the ten-kilowatt reactor to criticality by inserting a wand—containing some uranium from the original atomic pile constructed in Chicago by Enrico Fermi's team in 1942—into a mechanism that initiated the withdrawal of the control rods. Thereafter, the Argonaut was also dismantled in full view of the conference visitors, starting three days before the closing session.⁵²

Even more ambitious was Strauss's dream to unveil at Geneva a working model of a controlled thermonuclear device. Unfortunately, scientists responsible for Project *Sherwood*, the Commission's name for its controlled thermonuclear program, held only scant possibility that such a machine could be developed in time for the conference. Consequently, the *Sherwood* steering committee decided to feature research projects from the principal laboratories at Princeton, Livermore, Oak Ridge, and Los Alamos.⁵³

The launching of *Sputniks* on October 4 and November 7, 1957, and the comparative failure of the United States *Vanguard* heightened the Commission's determination to prove at Geneva that American nuclear science and technology were second to none. On October 19 Strauss and Libby urged the Commission's division of research to mount "an exceptional effort" to obtain a device producing thermonuclear plasma as a central show-piece for Geneva. It was almost certain by February 1958 that a controlled thermonuclear device would not be among the American "firsts" displayed at Geneva, but Strauss urged that the United States plan to exhibit its most advanced devices and research so that American prestige would not suffer badly should the Russians include a device they claimed produced thermonuclear neutrons. Even after falling back to the original plan of the *Sherwood* steering committee, the fusion exhibit ultimately commanded almost half the space allotted to the United States.⁵⁴

Perhaps the most significant achievement of this international competition was the declassification of Project *Sherwood*. On August 30, the

day before the formal opening of the conference, the United States and the United Kingdom dramatically announced the joint declassification of all research on controlled thermonuclear reactions. Dag Hammarskjöld, Secretary General of the United Nations, hailed this action as the lifting of "some of the very last barriers" restricting the exchange of scientific information. The Anglo-American declassification no doubt also prompted the French to disclose their previously secret plans to build a gaseous-diffusion plant to enrich uranium.⁵⁵

448 The Commission had not planned originally on participating in the commercial exhibits set up in the Palais des Exposition in downtown Geneva. The Americans, however, changed their minds in November 1957 when they learned that the British and French displays would occupy almost twice the space of that haphazardly reserved by United States firms. Consequently, the Commission contracted with the Atomic Industrial Forum to develop a representative commercial exhibition and to design, build, and manage an exhibit that would be a credit to the United States. The government's display was to be built around a model of a power reactor core, rising forty feet high. At the base was an information center telling the Atoms-for-Peace story. The Commission also supported the Atomic Industrial Forum in urging private industry to participate in the exposition.⁵⁶

The crowning success of the Geneva conference tended to obscure the deeper conflicts in the United States' policy in Europe. For the moment Europeans could set aside their frustrations over the role of the United States in the affairs of their continent as they attended technical sessions in the Palais des Nations or enjoyed the breathtaking displays of American accomplishment in the nearby exhibition hall. But the inconsistencies in American policy represented by the Administration's handling of EURATOM and the international agency had not been resolved. The question remained: Would the United States place its economic interests in Europe above its concern to protect the world from the military threat of the atom?

CHAPTER 17

TOWARD A NUCLEAR TEST MORATORIUM

In summer 1957, the Atomic Energy Commissioners realized that nuclear testing and fallout continued to pose a serious public relations problem. With the President already committed to stopping tests if at all possible, mounting international anxiety over nuclear weapons and fallout only strengthened Eisenhower's resolve to negotiate a verifiable test ban with the Soviet Union. Although Eisenhower did not achieve his goal in 1957, the Commission thereafter had to cope with increasing skepticism from both the White House about the need for large numbers of atmospheric tests and the scientific community about the safety of those tests. The general public, meanwhile, clearly favored a test cessation of some sort. The number of persons who called for a unilateral halt to testing was small, but by mid-summer 64 percent of Americans favored a multilateral agreement.¹ Public support for a multilateral test ban would gradually decline as negotiations bogged down, but a majority of Americans generally continued to want some kind of test ban.

THE PUBLIC RELATIONS PROBLEM

By and large, the Commission and the Joint Committee on Atomic Energy were satisfied with the outcome of the fallout hearings that had concluded on June 7. Shortly after Libby testified in June, he privately briefed the State Department staff on the effects and the significance of radioactive fallout, especially from testing. Commendably, Libby's briefing was consistent with his public testimony. Although he conceded that the Commissioners had learned a great deal about fallout since 1954, they still believed "that the risks involved in testing [were] infinitesimal."² At a Blair House party, James Ramey had confided in Gerard Smith that the Joint Committee was especially pleased at the amount of new information forthcoming at the

hearings. Yet Ramey conceded "that a majority of the reporters [were] in way over their heads," resulting in a great deal of simplified or distorted reporting.³

450 Dwight A. Ink, a member of the general manager's staff, succinctly outlined the public relations problem. In May 1957, the Commission had received almost six hundred letters from people concerned about the hazards of testing. In addition, Ink noted that criticism in the press and from abroad had increased dramatically. Against this background the fallout hearings had progressed well, with the Commission presenting its testimony calmly and effectively—for the benefit of the congressmen. Nevertheless, headlines featuring the hearings had underscored the dangers of fallout or had emphasized the disagreements among the scientists. Because public opinion would be shaped by the press reports rather than the hearing transcript, Ink predicted that the hearings would prove of little help in educating the public despite the excellence of the testimony. Although Ink tried to be optimistic, it was impossible to escape the conclusion that a defensive Commission, facing the divided opinion of the scientific community and the momentum of the disarmament talks, would find it almost impossible to mount a successful public relations campaign.⁴

The advisory committee on biology and medicine generally agreed with Ink's assessment. In a special meeting with the committee on June 18, 1957, Strauss acknowledged that "the climate was undesirable and unfortunate." Strauss reflected the Commission's consensus that fallout was not a matter of health or science but rather a public relations problem. Indeed, from Strauss's perspective, the Commission could not have avoided its predicament; rather, it had been trapped when in February 1955 the State Department had forced it to delay reporting the results of the *Castle-Bravo* fallout study. Strauss also wondered why the National Academy of Sciences report on fallout had been "brushed aside" by so many people, including prominent scientists. He considered Albert Schweitzer's appeal as "a body blow to the testing program."⁵

Almost literally, the Commission saw itself on the ropes, the defensive victim, not of sloppy testing or bad science, but of a deepening public relations fiasco. Strauss continued to believe that Americans would support the Commission's need to test if only the public could receive a full and accurate assessment of radiation hazards. Believing that an active testing program significantly helped to deter Soviet aggression, Strauss would have balanced the radiation exposure risks from testing against the devastation that would result from atomic war. In fact, American insistence on careful testing created difficulties for the United States in the disarmament talks. If testing and weapon production were halted, Strauss argued, the Russians would gain a distinct advantage because of their willingness to produce weapons without the extensive testing required by American engineering standards.

The argument that weapon testing and development were actual deterrents to nuclear war would be heard over and over again.⁶ Congressman Cole, for example, also believed it essential for the United States to develop "clean" tactical nuclear weapons to be used in limited wars. He did not think that the tactical use of nuclear weapons would inevitably lead to all-out, spasmodic nuclear war between the super powers. Cole granted that there was widespread public misconception that nuclear weapons were "wanton, indiscriminate and inhumane." On the contrary, he believed that nuclear weapons could be as precise, "humane," and limited in their use as any other weapon. The Russians, however, had constantly fanned the "flames of misconception" regarding the ruthlessness of atomic weapons. With its great manpower advantage it was in Russia's interest to outlaw nuclear tests and weapons through a campaign of fear, deceit, and propaganda. To Cole's dismay, the Soviets had been "astonishingly" successful.⁷

Cole's implication that advocates of a test ban were communist dupes, or worse, only reflected Eisenhower's comments at his June 5 press conference. Although the President later tried to soften his unfortunate remarks that the antitesting protests almost looked like "an organized affair," Congressman Francis Walter of Pennsylvania underscored Linus Pauling's association with communist-front groups. Furthermore, Representative Lawrence H. Smith of Wisconsin accused Norman Cousins of being a communist dupe by urging Schweitzer to join the test-ban movement. Cousins, in turn, scolded Eisenhower for his lack of generosity, noting that never before had Cousins known the President to impugn the good faith, integrity, or intelligence, let alone loyalty, of those who held views different from the Administration. Strauss wanted Eisenhower to send Cousins a long, blistering reply citing an article in the *U.S. News and World Report* that described how Pauling had organized his petition. Eisenhower did send Cousins the article, but in a tempered single-page note he merely assured the editor of the *Saturday Review* that he would continue pursuit of the peaceful atom but not at the expense of exposing Americans to unacceptable military risks.⁸

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ON THE BEACH

During the first two weeks of July, as Administration officials watched one of their most pessimistic nuclear war scenarios unfold in Operation *Alert* exercises at the Atomic Energy Commission, two dozen concerned scientists gathered at the summer home of industrialist Cyrus Eaton in Pugwash, Nova Scotia, to discuss ways of ending the nuclear arms race. Meeting from July 6 to 11, this first international Pugwash conference on science and world affairs attracted scientists from ten nations, including the Soviet Union. The conference prepared a report that, Linus Pauling noted, "cov-

ered the hazards arising from the use of atomic energy in peace and war, the problem of the control of nuclear weapons, and the social responsibility of scientists." As Pauling proudly reported, the three Soviet scientists at Pugwash signed the report; upon returning to Russia, they obtained the endorsement of 198 members of the Academy of Sciences and other Soviet academics. The Pugwash conference adjourned with an appeal for "the abolition of war and the threat of war hanging over mankind."⁹

452 Commission officials involved in Operation *Alert* at the Emergency Relocation Center, of course, were oblivious to the appeals of the Pugwash conference, but the secret results of the government's third annual disaster exercise were hardly less frightening than the published nuclear war scenarios that Americans would read in summer 1957. Most graphic was Nevil Shute's apocalyptic novel *On the Beach*, in which the entire world was laid waste by radioactive fallout. In Shute's fantastic book a spasm nuclear war between the great powers unleashed thousands of "cobalt" bombs that quickly rendered the northern hemisphere uninhabitable and slowly contaminated the rest of the world. Australians estimated that they had only nine months to live. Shute's hero was an American submarine commander who found temporary refuge in Australia. Drawn by the love of an Australian woman but determined to verify the fate of his wife and family, the commander sailed north, the only active remnant of the once powerful American Navy. Reconnoitering safely underwater where his crew escaped the effects of the deadly fallout, the commander cruised through the formerly lush Puget Sound to Seattle, which he found a lifeless desert. Ultimately, commander and crew had no choice but to return to Australia to await their fate.

One critic found Shute's novel banal, and others noted that it stretched scientific and military credulity to the point of science fiction. Nevertheless, the book became a best seller and, predictably, a popular movie. The popularity of *On the Beach* indicated that the American public now understood the strategic implications of the *Castle-Bravo* test.¹⁰ Blast and heat from thermonuclear bombs could be horribly devastating, but even more fearsome was the threat from widespread fallout that, if unlikely to contaminate the entire world, might poison millions of square miles and kill additional millions of people.

EFFECTS OF NUCLEAR WEAPONS

Although repeatedly accused of being too secretive and overly optimistic, the Commission published its own vision of nuclear war in summer 1957. If not as dramatic as *On the Beach*, Samuel Glasstone's *The Effects of Nuclear Weapons* was just as vivid and infinitely more accurate. In an earlier edition, *The Effects of Atomic Weapons*, published in 1950, Glasstone de-

scribed the destruction caused by a single "nominal" twenty-kiloton bomb. In his update, Glasstone not only changed the title to reflect the thermonuclear age but also noted that it was "no longer possible to describe the effects in terms of a nominal bomb." Rather, Glasstone outlined the blast, heat, and radiation effects of twenty-megaton thermonuclear bombs, a thousand times more powerful than the bombs dropped on Japan in World War II. With the expectation that the handbook would be used by civil defense personnel, the government released *The Effects of Nuclear Weapons* just prior to launching Operation Alert.¹¹

The Effects of Nuclear Weapons told its own grim story. Wood frame houses less than twelve miles from ground zero would be completely destroyed by a twenty-megaton blast. Houses as far as twenty miles away could have windows and doors blown in. Within six miles of ground zero, most multistory buildings would become rubble. Planes parked twelve miles away would be tossed about like toys. Within ten miles forests would be denuded, broken, blown down, or uprooted. In human terms, persons caught outside could suffer third-degree burns thirty miles away, and some individuals fifty miles away would receive first-degree burns.¹²

Reviewers noted that Glasstone did not mention "clean" weapons. Nevertheless, he included much information on radiation effects and fallout. Observing that a radiation dose of 700 roentgens spread over thirty-six hours would probably prove fatal, Glasstone, using fallout data from the *Castle-Bravo* shot, calculated the dosages persons would receive after an attack if they were caught in the open without shelter for a day and a half. A fallout plume nearly 20 miles wide at its base and 140 miles long would seriously threaten the lives of all persons who remained in the area unprotected; 220 miles downwind, deaths due to radiation would be negligible, although numerous victims would be temporarily incapacitated with radiation sickness. Soberly, Glasstone observed that true radiological warfare, although theoretically possible, was impractical with the old fission bombs. But after the development of thermonuclear bombs with high fission yields radiological warfare became "an automatic extension of the offensive use of nuclear weapons of high yield." Almost as if he anticipated *On the Beach*, Glasstone included a new chapter on worldwide fallout and long-term residual radiation. Glasstone's analysis was no more optimistic than an earlier study, *Radiation: What It Is and How It Effects You*, by Jack Schubert and Ralph Lapp.¹³

KISSINGER ON NUCLEAR WAR

Henry Kissinger's book on *Nuclear Weapons and Foreign Policy* was also published in time to be included on 1957's summer reading list. Although not as graphic as Shute's *On the Beach* or Glasstone's *The Effects of Nuclear*

454 *Weapons*, Kissinger's portrayal of nuclear war and its social, political, and economic consequences was just as shocking. Sponsored by the Council on Foreign Relations, Kissinger had developed his theories roughly concurrently with the Eisenhower Administration's reassessment of nuclear strategy following the *Castle-Bravo* test. Drawing from nuclear war theorists, including Warren Amster, Bernard Brodie, William Kaufmann, Basil Liddell Hart, and Robert Osgood, Kissinger stated boldly what insiders and professionals already knew: the United States could not rely on the strategy of "massive retaliation" when its potential enemy also possessed thermonuclear weapons.¹⁴ He analyzed the weakness of America's defense against conventional and thermonuclear attack and repeatedly stressed the need for a *credible* nuclear deterrent to contain Soviet expansionism. Kissinger believed the Russians would constantly nibble away at the West—first aggressively, then conciliatorily—but they would always be ambiguous. At no time would the United States be provoked into an all-out nuclear attack. Rather, the Soviet Union would confront Western powers with limited adventures, none of which would justify plunging the world into nuclear holocaust.

With Brodie, Osgood, and others, Kissinger struggled to develop a doctrine of limited nuclear war that would enable the United States to respond more flexibly to Soviet aggression in the nuclear age. Yet "limited war" and "limited nuclear war" could be easily confused. In summer 1957, no scenario stopped short of all-out nuclear war once nuclear weapons were unleashed. Although the Commission talked seriously of clean bombs and tactical weapons, nuclear weapons, however designated, could not be considered just another weapon in the American arsenal. Perhaps the terms clean and tactical reflected hopes to relate nuclear weapons to traditional warfare. Conventional wisdom held, nonetheless, that once introduced into battle the use of nuclear weapons could not be restricted.¹⁵

HOLIFIELD AND FALLOUT

From the Commission's perspective the success of the fallout hearings chaired by Congressman Chet Holifield was measured by the more than 2,000 pages of testimony recorded by the Joint Committee. The Commission had been able to present its fallout data along with a plea for increased support for Project *Sunshine* without creating undue alarm or criticism from the press; however, the Commission did not escape completely unscathed.

Perhaps the Commission's most outspoken critic over fallout at this time was Holifield himself. In his report to Congress, Holifield complained that the Joint Committee had to "squeeze the [fallout] information out of the Agency." Had it not been for Congressional hearings, Holifield argued,

the Commission would have withheld information important to the public. Even when the Commission did release fallout information on its own initiative, according to Holifield, the data were so technical or piecemeal that reporters and laymen alike had difficulty understanding their importance.¹⁶

More important, Holifield charged that the Commission had developed a "party line" on the hazards of fallout from nuclear testing—"play it down." Despite a responsibility to keep the public informed, the Commission was tardy in releasing information; but worse, according to Holifield, the Commission had selectively used information to support the Administration's political positions. Dredging up as well the conflict between Strauss's role as special adviser to the President and chairman of the Commission, Dixon-Yates, and the 1956 presidential campaign, Holifield linked these issues with the Commission's supposed muzzling of its scientists over the test-ban question.

As Senator Anderson had previously questioned the Commission's role as both promoter and regulator of the nuclear power industry, Holifield saw a "conflict of interests" on the weapon side. "Is it prudent," he questioned rhetorically, "to ask the same agency to both develop bombs and evaluate the risks of fallout?" Later, writing in the *Bulletin of the Atomic Scientists*, Holifield supported greater research efforts on radioactive fallout and its effects on human health, but only under the auspices of the National Academy of Sciences.¹⁷

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THE ASSESSMENT OF SCIENTISTS

Holifield's charges that fallout information could be pried out of the Commission only by Congressional investigation was especially irksome to Strauss, who felt he had been double-crossed by the congressman. For the past year and a half, the Commission had cooperated with a United Nations scientific committee on radiation that had been proposed by the United States. The Americans' purpose, to be sure, was to allay international fear of radioactive fallout through the international scientific committee; but there was also a sincere interest in determining the dimension of the danger. Shields Warren, Austin Brues, and Merrill Eisenbud were the United States delegates. In autumn 1956, Warren reported that the United Nations panel had made considerable progress in collecting and analyzing fallout data but nevertheless depended heavily on the United States and the United Kingdom for scientific information. Warren concluded with some satisfaction that "the willingness of the United States to share its information and, indeed, to assist other nations in collecting and analyzing fallout material, has certainly strengthened its position regarding the radiation problem."¹⁸

A year later the United States had submitted over thirty reports to the United Nations scientific committee, including papers on fallout, natural background radiation, genetic effects, occupational radiation hazards, generalized radiobiological effects, and waste disposal. The United States' first contribution had been the study prepared by the National Academy of Sciences—National Research Council, "The Biological Effects of Atomic Radiation." The Commission and the State Department considered the government's most recent contribution to be its testimony during the fallout hearings, which "provided the most exhaustive supply of data that has yet been compiled on this subject." In contrast to Holifield, the Administration viewed the Joint Committee hearings as part of the United States' continuing effort to inform the public and scientists throughout the world of the effects of fallout and radiation hazards.¹⁹

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In response to the Joint Committee's fallout hearings and the work of the United Nations scientific committee, the Commission's advisory committee on biology and medicine reviewed the entire program of the division of biology and medicine and found it restricted, underfunded, and understaffed. In addition, through the summer and into fall the advisory committee prepared a "Statement on Radioactive Fallout" for the Commission. The advisory committee noted that since 1954 strontium-90 content of the soil had markedly increased while concentrations in milk had "increased steadily with time." Even if weapon tests were stopped, fallout would continue for a considerable period of time. Unfortunately, with continued testing, long-range estimates were at best only "intelligent guesses." The advisory committee also estimated that testing would contribute to a small increase in leukemia deaths and would cause some genetic damage in the world's population, which in the course of time could be "large in absolute terms."²⁰

Although the members of the advisory committee on biology and medicine admitted that fallout from testing could be a problem, they nevertheless continued to believe that testing was necessary for national security. They urged the Commission to hold testing "to a minimum consistent with scientific and military requirements." It was unprecedented for the advisory committee publicly to request restraint from the Commission.²¹

HARDTACK REEXAMINED

In August 1957 Eisenhower met with Strauss, Smith, and Cutler to discuss forthcoming weapon tests. The President was alarmed over both the large number and the excessive length of the tests scheduled for *Hardtack* in spring and summer 1958. Because of the disarmament discussions, the Commission and the military liaison committee had agreed to accelerate the testing program. Strauss told Eisenhower that he had cut in half the num-

ber of shots requested by the laboratories and the Department of Defense. Still, he agreed with the President that too many tests were scheduled. Strauss also admitted that four months—May through August—would seem like a long time, especially if disarmament talks were proceeding concurrently. Requirements that the weather be perfect for testing, however, dictated the lengthy schedule.²²

The fallout issue no doubt caused Eisenhower to question the size of some proposed *Hardtack* shots as well. Strauss conceded that the Commission and the State Department saw no need to test very large weapons. The requirement to test multimegaton weapons had come from the Department of Defense, which wanted to determine what size and yield a B-52 could carry. In response to the President's skepticism, Strauss offered a compromise that would limit all *Hardtack* shots to a yield not larger than the 1954 *Castle-Bravo* test, a limitation that would become permanent. Although Eisenhower granted authority to continue planning for the *Hardtack* tests, if limited in size and condensed in time, he expressed his frustration at having to conduct extensive tests on the one hand while professing readiness to suspend testing in a disarmament program on the other. World opinion would be skeptical of the President's good faith in view of United States' paradoxical conduct.²³

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Strauss took the President's case directly to Donald Quarles, the Deputy Secretary of Defense. Uncharacteristically, Strauss was sharply critical of the weapon program. He compared it to the faltering missile program—too many designs, too much interservice rivalry, too much time spent on engineering refinements, and too little time spent on developing radically new approaches. The consequences were unhealthy and self-defeating. The laboratories were burdened with programmatic minutiae instead of original work. Scientists were so overloaded that they had little time for reflection or exploration. Before one test series was even concluded, the laboratories began planning for the next. Not only was the government spending unnecessarily large sums of money, but it was also aggravating United States and world sentiment to the extent that testing itself was endangered. Strauss admitted that the Commission was not free from criticism, but the greatest impetus for unnecessary tests came from the Department of Defense. Noting that he had assured the President that *Hardtack* would "not test beyond what is 'necessary,'" Strauss left no doubt that he hoped Quarles would make an honest man of him.²⁴

Ultimately, Eisenhower authorized thirty-five tests in *Hardtack* Phase I, which featured six clean designs in a variety of yields; an additional clean test for United Nations observation was under study. Although worldwide fallout from *Hardtack* would be slightly greater than from *Redwing*, Strauss assured Eisenhower that it would be less than half of that from *Castle*.²⁵

LONDON REVISITED

The United States and its allies had welcomed the Soviet Union's acceptance of scientific inspection posts for fallout detection within the Russian homeland. In addition to Eisenhower's June 19, 1957, press conference, which hailed the prospects of a test ban, the allies officially acknowledged on July 2 the possibility of "a temporary suspension of nuclear testing as part of an agreement for a first step in disarmament."²⁶

Despite public optimism, both the allies and the Eisenhower Administration remained skeptical that the Soviet Union would agree to an acceptable or a desirable agreement. In London, Stassen detected concern that a test moratorium could have unfavorable results. In Washington, Dulles was especially pessimistic about the London negotiations. Acknowledging Stassen's continuing optimism to British Ambassador Sir Harold Caccia, the Secretary of State discouraged Macmillan's proposal for private disarmament discussions with Eisenhower on the grounds that the timing was poor. Both the President and Dulles believed the negotiations would require much more time.²⁷

Problems with Nikita Khrushchev and verification remained serious issues. During the first week of July 1957, Khrushchev emerged the victor in a Kremlin power struggle in which Malenkov, Molotov, Kaganovitch, and, ultimately, Bulganin were the losers. Khrushchev's rise to power with the full backing of the Soviet military establishment would raise questions in the Administration about the Soviets' commitment to disarmament. A few days later, Dulles told New Zealand's foreign minister, T. L. MacDonald, that he thought the London negotiations were simply a propaganda battle with little chance of success. In spite of the Soviet acceptance of inspections in principle, Dulles did not believe the new regime in Moscow would accept a workable system.²⁸

Increasingly, the Administration felt trapped by the disarmament negotiations. By the end of July, Eisenhower wondered about the possibility of a recess in London, but Dulles responded that the talks "were in mid-stream and could not stop." Eisenhower's frustration was compounded by the fact that Strauss reported a steadily mounting campaign of letters and petitions addressed to the President demanding a ban on nuclear weapons and/or the cessation of weapon testing. Perhaps the best move, Eisenhower suggested, was for Dulles to go to London to take "command of the situation."²⁹

As it turned out, Eisenhower's decision to send Dulles to London was shrewd. In the first place, only Dulles could shore up the allies' faltering confidence in American leadership. To be sure, Dulles's appearance again undermined Stassen, but it also enabled Dulles personally to assure the British, French, Canadians, and the NATO allies, including the West Germans (who were not a party to the negotiations), that the United States

would not entertain aerial and ground inspection zones unacceptable to its allies. By August 2, having pulled together a unified front, Dulles was able to present an inspection working paper on behalf of the United States, Britain, France, Canada, and NATO. By further undercutting Stassen, Dulles served notice to the Soviets that the disarmament subcommittee's work in London would be fruitless. No doubt this move suited the Russians because Khrushchev apparently wanted to take disarmament questions to the summit.³⁰

Returning to Washington, Dulles confirmed the importance of his mission to London. Without his presence, Dulles did not believe the United States could have obtained the concurrence of its NATO allies, especially West Germany, to the American inspection formula. Nonetheless, he confided to Strauss his pessimism that anything would come from the London negotiations, Stassen's persistent optimism notwithstanding. Dulles had no illusions that Khrushchev would ever allow mobile ground inspection teams from the West to roam freely around the Soviet Union.³¹

With the handwriting on the wall in London, it was evident to Dulles that the United States would have to revise its disarmament position by strengthening the link between a test moratorium and inspections. On the morning of August 9, the President, his son, Dulles, Gerard Smith, and Robert Cutler met to reassess the Administration's June 11 position. For a permanent test ban, the United States would continue to insist that satisfactory progress be made in negotiating inspections for testing, stockpiling, and producing special nuclear material. But Eisenhower also suggested that the United States announce its willingness to suspend tests for twenty-four months while the nuclear powers sought to solve the inspection dilemma. Should a solution not be found, testing could be resumed, or suspension might be extended beyond twenty-four months by unanimous agreement. If there were a violation of the testing suspension, of course, any party could begin testing again.³²

Strauss joined the group for the afternoon session. On hearing the President's proposal, he protested that the best scientists would leave the Commission's laboratories if there could be no tests or experiments for two years or more. Eisenhower shrugged off his objection with the remark that the world situation was so difficult that Strauss's point was simply irrelevant. Ultimately, the President agreed to approve a twelve-month suspension of tests, with the possibility of an extension, after all parties agreed in principle to a cut-off of nuclear material production. Rebuffed by Eisenhower, Strauss pledged that the Commission would certainly support the President's decision and work for it. Not so certain about Stassen, Dulles and Smith decided not immediately to inform "the man in London" for fear that he would prematurely compromise the new policy on testing and disarmament.³³

On August 15, Smith briefed the Humphrey subcommittee of the

Senate Foreign Relations Committee on the adjustment of the Administration's disarmament policy. Clearly, the Americans were not out to compromise with the Russians; rather they sought to quiet nervousness among the NATO allies while improving the United States' posture in the forthcoming United Nations debates. Smith explained that the Soviet Union had offered to suspend testing for two years, independent of disarmament agreements. The United States would now counter with a proposal to halt testing for twelve months, with an extension limited to twelve months if a cutoff to the production of nuclear materials were not established. To the senators' satisfaction, Smith explained that the new policy would strengthen the United States' position in the General Assembly debates on testing and would increase American freedom to continue testing in the future.³⁴

460 In London, through most of August, Zorin remained calm while the American delegation consulted with its NATO allies. Word of the United States' revised position inevitably began to leak out in Paris and London. Consequently, on August 21 Eisenhower announced that the United States would be offering new "first-step" disarmament proposals, including a two-year test moratorium "under certain conditions and safeguards" and a permanent cessation of producing fissionable materials.³⁵

For the Soviets, Eisenhower's offer was apparently the last straw. On August 27, two days before the West formally presented its new proposals to the London Disarmament Conference, Zorin launched a sharp attack denouncing the West for cynical delays and dishonesty. According to Zorin the Western powers virtually had given NATO a veto over the disarmament talks. With the denigration of Stassen, it was evident to the Soviet Union that the effective usefulness of the disarmament subcommittee was at an end. Zorin angrily anticipated that the Western powers were signaling their disenchantment with the London talks. Charging that the United States had been arming NATO "under cover of fruitless disarmament talks," Zorin's intemperate remarks left little doubt that the Soviet Union also sought another forum for disarmament negotiations.

Only Stassen remained optimistic about the future of the disarmament subcommittee. Hurriedly returning to the United States, this time ostensibly to attend his son's wedding, Stassen claimed that the major powers were closer together than at any time since the end of World War II. He conceded that Zorin's remarks posed a serious obstacle to an agreement, but he thought that the Russians were preparing to make concessions that they did not want interpreted as weakness. The United States should not overreact to Zorin because the Russian bluster was probably only a prelude to a propaganda alternative in the event of failure to agree. Eisenhower, of course, could only express indignation at the Russians' scornful attack while Dulles and Strauss felt some relief at Zorin's behavior. Dulles thought that perhaps the United States had already gone too far. Strauss, who

wanted to avoid a test ban, hoped that when the talks seriously resumed the United States could go back to "first principles," rather than negotiate on the existing proposals.³⁶

On August 29, the United States and its allies submitted a new test suspension proposal to the London Disarmament Conference as part of a comprehensive disarmament package. The proposal called for the suspension of nuclear tests for a period of twelve months provided that the conference reached agreement on the installation and maintenance of the necessary controls, including inspection posts with scientific instruments. Tests would be suspended for an additional twelve months if satisfactory progress was achieved in preparing an inspection system for ceasing production of fissionable material for weapon purposes. When the Soviets rejected the disarmament package in early September, there was little alternative but to adjourn the conference without setting a time or place for its next session.³⁷

NUCLEAR TESTING CONTINUES

Neither the Americans, the British, the French, nor the Russians were anxious for an immediate end to nuclear testing in summer 1957. The French had not yet tested their first weapon, and, with a test ban in the offing, the other nuclear powers wanted to complete all planned tests promptly. Throughout the London conference, the United States had continued testing in Nevada. On September 19, during Operation *Plumbbob*, the Commission fired the *Rainier* shot, a 1.7-kiloton device exploded in a tunnel drilled 2,000 feet into a mountain side. *Rainier* produced no atmospheric radioactive fallout or venting. Edward Teller had been a prime mover behind this first contained underground explosion, which demonstrated that testing could be continued underground without radioactive fallout. The Soviet Union began its 1957 series of six tests, some in the megaton range, on August 22, five days before Zorin verbally blasted the Western delegations in London. That same fall, the United Kingdom conducted tests in Australia, then concluded its experiments on November 8 with a thermonuclear shot at Christmas Island. After *Plumbbob*, the Commission intended to resume testing in 1958 with the Pacific *Hardtack* series scheduled to begin in the spring.

According to one calculation, in 1957 the three nuclear powers had exploded forty-two devices, compared to nineteen the year before. With more American tests planned in 1958, the international climate did not appear auspicious for a test moratorium. Yet there were signs that progress had been made. The major powers recognized the terrible, and unacceptable, destructiveness of nuclear warfare. In turn, they knew that the danger of nuclear war would be reduced by controlling nuclear proliferation and

avoiding international confrontations and accidents. They would have to stop and then reduce the alarming buildup of atmospheric radioactive fallout. They hoped to ease the Cold War through confidence-building "first steps." Despite the denigration of Stassen and the tight linkage between a test ban and other disarmament issues, the United States had clearly signaled both its NATO allies and the Soviet Union that the United States was willing to negotiate on the testing issue. In turn, the Soviet Union had acknowledged the Western power's need for adequate safeguard and inspection systems. Although significant differences between the West and the East remained, the gap between the two on the test-ban issue had been narrowed. Control of conventional weapons and forces aside, agreement was possible in two areas. Given the ease of detecting large atmospheric tests, some limitation of nuclear tests seemed probable; given the fear of surprise attack, some combination of ground inspection and Open Skies was essential.³⁸

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THE DISARMAMENT GENERAL ASSEMBLY

The twelfth session of the United Nations General Assembly became known as the "Disarmament General Assembly." As the State Department noted, seldom had so many nations placed disarmament issues so high on the General Assembly's agenda. Having failed to reach an agreement in the five-power disarmament subcommittee, the United States and the Soviet Union carried their propaganda battle to the General Assembly in September 1957.

In his opening remarks on September 20, Soviet Foreign Minister Andrei Gromyko again insisted on the importance of discontinuing all nuclear testing independent of any other disarmament agreement. As a measure of its concern, the Soviet Union would place the test-ban issue before the General Assembly as a separate and independent agenda item. In Gromyko's words, it would be a "first practical step towards the main goal—the absolute and unconditional prohibition of atomic and hydrogen weapons."³⁹ With this statement the Soviet Union had once again revived its old cry to "ban the bomb." All along, Strauss and the other Commissioners had argued that the Soviet Union ultimately sought to dismantle NATO's atomic shield; there was all the more reason for the United States to hold fast to its own linkage between testing, cutoff, inspection, and safeguards.

Dulles checked his own General Assembly address with Eisenhower. In his speech to the United Nations on September 19, 1957, Dulles reiterated the United States' determination to stand by its recent London proposal linking a test ban with a production cutoff. Dulles wanted to im-

ply, but not actually say, that even without an agreement with the Soviet Union the United States was eager to develop with its allies a common position on arms control, nuclear proliferation, and test limitations, both in duration and yields. As he wrote to Macmillan the same day, "I tried to give the impression that we could, through our collective security systems, do something in the way of limitation of armament which would give us some financial relief and enable us to meet world opinion, all consistently with having collectively an adequate military establishment." Dulles evidently sought relief from both the press of public opinion and the weight of the defense budget.⁴⁰

Stassen continued to press hard for moderating the London proposals; even Eisenhower began to grow weary of his disarmament adviser. Following Adenauer's success in the West German elections, Stassen urged another reassessment of the American policy and approach to disarmament, including a two-year suspension of testing without other disarmament conditions. "Informal quiet bilateral exploration of the USSR position, while keeping our Western partners advised, is the key for results," he advised Dulles. Stassen thought it desirable for Dulles to ask the Kremlin to send Zorin to the United Nations in New York so that informal discussions could be continued.⁴¹

Dulles was horrified. In sharp rebuttal, the Secretary of State rejected Stassen's overture. How could any consideration be given to altering a policy less than one month old, one that had been hailed by the President as "historic" and lauded by Dulles before the United Nations? Dulles contended that Stassen's ideas on testing ran counter to the positions of the Department of Defense, the Joint Chiefs of Staff, and the chairman of the Atomic Energy Commission.⁴²

The reactions of Donald A. Quarles at Defense, Nathan F. Twining, chairman of the Joint Chiefs of Staff, and Strauss were predictable. Strauss summarized it very simply: "what is being suggested is a complete abandonment of our position," contrary to the security interests of the United States. All urged Dulles to hold fast to the August 29 London proposals. Each response was shared with Eisenhower and Nixon, who now began seriously to consider replacing Stassen; however, any such move would only further complicate an already messy situation.⁴³

American and Russian maneuvering continued at the United Nations. In addition to their proposals to ban both weapons and testing, the Soviets asked that the membership of the disarmament commission be expanded to include all members of the United Nations. For their part, the Western powers sought an endorsement of the August 29 London proposals from the General Assembly. With twenty-four sponsors, the London proposals won endorsement, but over the opposition of the Soviet bloc and despite abstention of most Asian and African members. In turn, the disar-

mament commission was expanded to twenty-five members by a similar vote, after which the Soviets announced they would no longer participate in negotiations of either the commission or its subcommittee. On testing, the Soviet Union withdrew its resolution in favor of one sponsored by India. With the solid opposition of the NATO countries, however, the substitute test-ban resolution was defeated. The Western powers had "won" on each of the resolutions, but they did not achieve the propaganda victory sought by Dulles.⁴⁴

SPUTNIK

464 On October 4, 1957, *Sputnik I* stunned Americans. Since the dawn of the atomic age in 1945, Americans had believed that they had become pre-eminent in science and technology. At the 1955 peaceful uses conference in Geneva, American experts had gained a healthy respect for Soviet nuclear science and technology. Nor were American leaders naive about Soviet military capability or about the fact that the Russians were well advanced in missile development. Nonetheless the Russians' outstanding achievement during the International Geophysical Year took most Americans by surprise. When the Soviet Union followed up a month later by launching the half-ton *Sputnik-II*, which carried a live dog, shocked Americans knew they were behind in the space race. More ominously, it was also apparent that the Soviet Union was ahead in developing ballistic missiles capable of carrying a thermonuclear warhead.

To reassure the public, Eisenhower addressed Americans over television on November 7. Although the United States was second to none in military strength and scientific leadership, the President promised that his Administration would give high priority to government support of science and technology. To back up his pledge, Eisenhower announced that he had appointed James A. Killian, Jr., president of Massachusetts Institute of Technology, to be his special assistant for science and technology. Later, he enlarged the science advisory committee in the Office of Defense Mobilization and transferred it to the White House on December 1. The President's Science Advisory Committee, chaired by Killian, offered direct presidential access to scientists fundamentally antithetical to Teller, Lawrence, and Strauss. Not only did *Sputnik* provide "liberal" scientists renewed access to the White House, but the President's Science Advisory Committee also assured that new voices would join the internal debates over the Administration's nuclear testing and disarmament policies. Thus, as Stassen's influence waned, *Sputnik* ironically created a new circle of eminent advisers who would soon be deeply involved in test-ban negotiations.⁴⁵

THE GAITHER REPORT

The President received bad news of another sort on November 7 when the Gaither committee reported to one of the largest National Security Council meetings in history. The Gaither committee had been appointed in spring 1957 shortly after the Federal Civil Defense Administration had recommended to the President that the United States spend \$40 billion over several years to build shelters against nuclear attack. Acting through the National Security Council, the President asked H. Rowan Gaither, Jr., chairman of the board at both the Ford Foundation and the RAND Corporation, to head an ad hoc panel to evaluate the civil defense proposal in relation to larger defense and national security issues. Robert C. Sprague, a Massachusetts industrialist and an expert on continental defense, was named codirector of the committee.⁴⁶

According to one commentator, after the committee members had sifted through a mass of material, they concluded that the top echelons of the government did not know the full extent of the Soviet threat.⁴⁷ Actually, the exact opposite may have been the truth: by fall 1957, the corporate, scientific, and academic communities began to understand the President's deep concern about national security in the thermonuclear age.

Like the Killian report of 1955, the Gaither report stressed the vulnerability of the United States' deterrent, especially the strategic forces. Civil defense received secondary consideration from the Gaither committee, which concentrated on the danger of surprise attack on the Strategic Air Command and on the need to maintain an effective second-strike force. *Sputnik*, of course, heightened fears that the Russians held a significant lead in deploying intercontinental ballistic missiles (ICBM), against which the United States had no defense. The four years from 1959 to 1963 would be critical for developing ICBM deterrents and antimissile defenses. Once the United States had regained its retaliatory advantage on which the deterrence doctrine depended, the committee recommended that the United States concentrate on assembling a conventional force capable of fighting limited wars. This approach would require a vastly increased defense budget, which Eisenhower was committed to keep under control.

Regarding the Federal Civil Defense Administration's original request to build bomb shelters, the Gaither committee recommended against constructing blast shelters and set as a first priority spending several hundred million dollars on shelter and civil defense research. As a secondary priority, the committee endorsed spending \$22 billion on constructing fallout shelters.⁴⁸

Eisenhower was not happy with the Gaither report and complained to Dulles that it had been a mistake to call in an "outside group." Dulles agreed that such groups seldom took "a rounded view of the total situation,"

especially as it involved the Administration's attempt to control inflation in a sputtering economy. Eisenhower confided that he could not justify spending billions for shelters. For Dulles the issue was "largely a matter of temperament," and he was temperamentally unsympathetic to passive civil defense. Dulles believed that a strong offensive capability was the most effective deterrent. More important, the Gaither committee had confined itself to military problems although the international struggle against communism was not just military. Eisenhower found the Gaither report "useful," but he decided not to make it public on the grounds that advisory studies prepared for the President and the National Security Council ought to be kept confidential.⁴⁹

466 NATO, MACMILLAN, AND A CRISIS OF CONFIDENCE

The collapse of the London disarmament talks, the acrimony of the United Nations debates, the reaction to *Sputnik*, the creation of the President's Science Advisory Committee, and the reception of the Gaither report all reflected a deepening crisis of confidence within the Administration. If the Gaither committee had raised questions about the vulnerability of United States' defenses, there remained the even larger question about the state of the Western alliance. In late October 1957, Macmillan hurried to Washington to review the NATO partnership with Eisenhower. Strauss, who stopped in London on his way home from a meeting in Vienna, had already laid much groundwork for the discussion.⁵⁰

At the British embassy on Massachusetts Avenue, Dulles and Macmillan shared a grim view of the future. The Western allies who themselves did not possess nuclear weapons or technology were uncertain, bewildered, and frightened. Who would decide how nuclear weapons would be used in their defense? In addition, as the cost of the nuclear deterrent increased, there would be less and less capacity, and perhaps even less utility, in maintaining the original "shield" principle. Originally NATO had been conceived as a bulwark of ready divisions sufficient to defend Europe while the nuclear powers mounted their counterattack. But the concept had never been realized, and it was increasingly anachronistic in terms of cost and military strategy.⁵¹

In fact, the Americans and the British had no choice but to shore up the NATO alliance as best they could. One consequence of *Sputnik* was that the Administration renewed consideration of integrating tactical weapons, including intermediate range ballistic missiles, into the NATO forces. A first step would be to negotiate a military bilateral with the United Kingdom allowing Americans to share their nuclear weapons with the British. To do so, however, would require an amendment to the Atomic Energy Act. At the conclusion of his meetings with Macmillan, Eisenhower announced

he would seek an amendment "to permit . . . close and fruitful collaboration of scientists and engineers of Great Britain, the United States, and other friendly countries." As Senator Anderson observed, *Sputnik* not only upset Americans' complacency about their role in space but also their confidence in "winning" the arms race.⁵²

Anderson and Durham on the Joint Committee were mystified, and just a little concerned, about what Eisenhower meant. Recalling the Klaus Fuchs spy case and the defection of Burgess and MacLean to the Soviet Union in 1951, they again raised questions about British security. Where would one draw the line between the British and other NATO allies in sharing nuclear weapon information? Strauss, who had consistently opposed sharing nuclear weapon information with the British, had a system: he would not give the British any information that the Russians did not already have. After Gerard Smith complained to Dulles that Strauss's restriction would nullify any agreement, Eisenhower privately assured Macmillan that he wanted genuine cooperation with the British. Strauss, feeling caught in the middle and very much embarrassed by Eisenhower, wondered if he should not resign. Dulles was quick to mollify Strauss by complimenting him on his skillful handling of a difficult matter.⁵³

The extraordinary tension created by *Sputnik* also appeared in Dulles's attempt to enlist Adlai Stevenson in bipartisan support of the Administration's NATO policy. Dulles asked Stevenson to head a task force that would implement the President's plan for nuclear cooperation within NATO. Dulles shared with Stevenson NATO fears that the United States might misuse its nuclear power or, perhaps as bad, not use it at all in the defense of Europe. Appealing to Stevenson's altruism, Dulles foresaw a new international body that would control nuclear weapons "as a community asset and trust for the free world," rather than as a strictly national asset. Dulles would begin by creating a nuclear weapon stockpile for NATO as a way of assuring the allies that they could count on the United States in the face of the growing Soviet threat. At home, the Administration needed not only to amend the law but also to convince the Commission and the Department of Defense of the wisdom of trusting friendly powers with weapon information.

Stevenson was naturally wary of being compromised, and for four hours on the evening of October 30 he explored the matter privately with Dulles. He told Dulles frankly that he was unhappy with the Administration's emphasis on military preparedness over economic development. Furthermore, he thought the disarmament proposals were "unfair" to the Russians in that they had nothing to gain from reciprocal inspections. Like Stassen, Stevenson favored an inspected test ban independent from a cutoff of weapon production. Stevenson did, however, agree to help Dulles prepare several study papers.⁵⁴

Eisenhower's stroke on November 25, 1957, upset this unusual bi-

partisan project between Dulles and Stevenson. At lunch the following day, Strauss told Stevenson of the President's most recent illness and relayed from Dulles that Eisenhower had only suffered a slight loss of speech. With a clear mind and no other impairments, Eisenhower planned to rest at Gettysburg for about three weeks. Still, his participation in the forthcoming NATO summit was in doubt. If Eisenhower could not attend, Stevenson believed the NATO meetings should be held on the ministerial level, not at the summit with Vice-President Nixon in Eisenhower's place. Stevenson continued to assist Dulles in the preparations up to the eve of the NATO summit, and then he quietly bowed out, in part because he felt unwanted but no doubt also because he disagreed with much Republican foreign policy.⁵⁵

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World attention was focused on Paris. On November 28, Indian Prime Minister Nehru appealed to both Eisenhower and Khrushchev to end nuclear testing and the arms race. "No country, no people, however powerful they might be, are safe from destruction if this competition in weapons of mass destruction and cold war continues," Nehru wrote. Subsequently, on December 10, Bulganin, now a mere figurehead for Khrushchev, wrote Eisenhower calling for a summit meeting on disarmament. In his letter, written less than a week before the convocation of the NATO conference, Bulganin also asked the United States and the United Kingdom to join the Soviet Union in a two- to three-year test moratorium starting January 1, 1958. In an obvious attempt to strain the NATO alliance, Bulganin included a proposal to create a nuclear-free zone in Western and Eastern Germany. The Bulganin letter seemed intended to embarrass Eisenhower prior to the NATO meeting, but it also served notice on the Western powers that the Soviet Union was willing to continue serious disarmament negotiations.⁵⁶

It was evident from the American and British perspective that disarmament talks had reached a turning point after the collapse of the London Disarmament Conference and well before *Sputnik*. But *Sputnik* had precipitated the emergency meeting between Eisenhower and Macmillan in late October when the heads of state met in Washington to search out a common front. The Soviet satellites cast a pall over the December NATO summit in Paris, but so did the faltering Western economies, the President's uncertain health, and the miserable weather.⁵⁷ One can only speculate on whether or how *Sputnik* influenced the Soviet decision to abandon the disarmament subcommittee.

From Eisenhower's perspective, the NATO summit was a success. Most important, he was able to attend and to function normally. Each day confidence and mutual trust increased. In addition to agreements on nuclear warheads and intermediate range ballistic missiles for allied forces in Europe, the summit proposed a foreign ministers' meeting with the Soviets to try to break the disarmament impasse. In principle, the NATO powers endorsed a controlled reduction of arms in Europe on the condition that the

Soviet Union agree to adequate reciprocal inspections. They also decided to establish a group of scientists to advise on technical problems arising from proposals on arms control.⁵⁸

Eisenhower's flexibility on disarmament was more fully revealed in his postconference correspondence with Macmillan. The British continued to endorse the four-power London disarmament proposal, but Macmillan urged Eisenhower not to dig in his heels. The President had no intention of doing so, and he pointed to the NATO summit, which already indicated the West's willingness to talk. For the United Kingdom, the biggest obstacle to a test ban was the comparative inferiority of British nuclear weapons. For that reason Eisenhower wanted to amend the Atomic Energy Act so the British could have access to whatever weapon information was necessary. With parity, the British would have no reason to continue testing. In his belated response to Nehru, Eisenhower gave no indication that he would break the link between a test ban and a production cutoff. As he wrote to Nehru on December 15, "to do so could increase rather than diminish the threat of aggression and war."⁵⁹

By late 1957 most of those in the President's inner circle agreed that the United States was in a weak position on disarmament and the test ban. Reports from the Paris NATO meeting, from an International Red Cross conference in India, and especially from the United Nations in New York all indicated that the continuing deadlock was eroding America's moral leadership in the West. Stassen, for one, believed that the time had come for the United States to advance new proposals.

STASSEN'S FINAL PROPOSAL

If Eisenhower was moving closer to Stassen's position on the test ban and disarmament, he was also steadily losing confidence in his disarmament adviser. Only four days after *Sputnik*, Eisenhower had authorized Stassen to explore just how open the Soviets might be to inspections, cutoff of weapon production, and other aspects of the London proposals. Eisenhower was keeping his options open by signaling his own flexibility. Yet a few days later, he complained about the heavy expenses of Stassen's office—about \$500,000 annually—and expressed the hope that Stassen would accept an appointment as ambassador to Greece. Dulles was frank in telling Stassen that he would welcome the change because Stassen was so badly out of step with Strauss, the Joint Chiefs of Staff, and the Department of Defense. Dulles did not include Eisenhower among those who opposed Stassen's initiatives, but the President solidly supported Dulles's determination to sack Stassen. Although Stassen played a small role in preparing for Macmillan's visit, he had little access to the White House after his return from London. Yet by the Christmas holidays, Dulles confided in Nixon that the

Administration was heading for a "showdown" with Stassen when he presented a revised disarmament plan to the National Security Council on January 6, 1958.⁶⁰

470 Stassen argued for three changes in the disarmament policy announced in London on August 29. All his proposals, he believed, would be acceptable to NATO. First, Stassen proposed dropping the linkage among the various disarmament proposals. The linkage, Stassen argued, was the major reason for the deadlock and only made the Americans appear intransigent. Second, he wanted to give the production cutoff a lower priority so that a twenty-four month test moratorium might become feasible. Finally, he suggested limited, confidence-building inspection zones for Europe, western Russia, Siberia, the Arctic, the Pacific Northwest, and western Canada with eight to twelve monitoring stations in both the United States and the Soviet Union; Stassen may have received some indication that the Soviets would be receptive to the new inspection plan. In any event, he believed his proposal would provide the basis for important first steps toward disarmament or a test ban.⁶¹

Unfortunately for Stassen, the Joint Chiefs of Staff, the Department of Defense, and the Commission were determined to stick by the August 29 proposals. Strauss presented the Commission's objections to a twenty-four month test moratorium, claiming that it would hurt both the development of the clean bomb and *Plowshare*, the peaceful uses program. Again, he stressed that the national laboratories would have great difficulty recovering from the negative effects of a test moratorium. Then speaking just for himself, Strauss objected to backing down from a sound disarmament position. He concluded by reporting that Teller and Lawrence believed that several score inspection stations, not a dozen, would be required to detect all tests in the Soviet Union.

Henry Cabot Lodge opened the way to further discussion when he supported Stassen's position. In responding to Lodge, Dulles revealed his own ambivalence about the United States' disarmament posture. The main obstacle to Western agreement on the issues was not NATO but the British and French, who opposed a test moratorium unless the United States would share information on nuclear weapons. Dulles also thought that the inspection zones proposed by Stassen would be politically unacceptable on all sides. At the same time, Dulles admitted that the United States had to consider public opinion. He worried that the United States could not retreat from the August 29 proposals without suffering a major propaganda defeat, but he acknowledged that the United States could not stand indefinitely on a rigid disarmament platform.

Eisenhower was as perplexed as Dulles. He agreed with Stassen and Lodge that public opinion was driving American disarmament policy. But without an amendment to the Atomic Energy Act allowing the United States

to share its nuclear technology, Eisenhower predicted that NATO would collapse. He concurred with Dulles that the time was not ripe for new proposals requiring coordination with NATO. Although Eisenhower did not like Stassen's proposed inspection zones, neither did he believe that these proposals retreated from existing policy. Most puzzling to Eisenhower was the conflict between his scientific advisers, especially Teller and Rabi, with Strauss supporting one side and Stassen the other.

From his "back bench," Killian interrupted to report that the Science Advisory Committee had already organized a technical study on the impact of a test ban on United States and Soviet weapon programs and on the feasibility of monitoring a test suspension. Eisenhower and Dulles were immediately interested. As Killian recalled, Dulles "had been looking for something to support his intuitive view that the United States should move toward a suspension of tests." Then and there, Eisenhower asked the National Security Council to sponsor the technical study on detecting nuclear tests. The President closed the meeting with the comment that the burden of the arms race hung heavy everywhere. For that reason, the United States should keep the world focused on nuclear disarmament.⁶²

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The National Security Council meeting on January 6 proved to be Stassen's "last hurrah" in the Eisenhower Administration. Perhaps more than anyone else on the President's staff, Stassen had worked to keep Eisenhower's test ban and disarmament options open. After the National Security Council ostensibly rejected his recommendations, Stassen knew he would have to resign. By February he was gone, but he had won a quiet victory. In its subsequent order, which established the technical panel on disarmament under the chairmanship of Hans Bethe, the National Security Council noted the Administration's adherence to the August 29 four-power proposals "for the time being." That is, the council would reexamine its policy should Congress amend the Atomic Energy Act allowing the United States to share its nuclear weapon information. The President and his advisers may not have realized it yet, but the Administration had forged, in effect, new linkages to a test suspension while greatly weakening the old. Obviously, it would be much easier to convince Congress to amend the Atomic Energy Act than it would be to negotiate a production cutoff with the Soviet Union.⁶³

THE BETHE PANEL CONVENES

The year 1958 began with little public indication of the Administration's shifting views on disarmament. In his note to Nehru and in his public statements to NATO, Eisenhower had already indirectly told the Russians that the United States was sticking to its August 29, 1957, proposals. On

January 12, in a letter to Bulganin, Eisenhower seemed to offer little more than a restatement of the August 29 principles. He agreed to meet with the Soviet leaders, but only after necessary groundwork had been laid at the ministerial level. Candidly, Eisenhower expressed his wariness of high-level meetings, such as the euphoric 1955 Geneva summit, which created great expectations and subsequently disillusionment, dejection, and even greater distrust. Eisenhower did, however, invite the Soviets to join American scientists in technical studies of the possibilities of verification and supervision of disarmament and test-ban agreements.⁶⁴

Eisenhower's proposal for technical studies with the Soviet Union was neither unprecedented nor original, but it obviously reflected the National Security Council's decision to authorize technical disarmament studies of its own. At the conclusion of the 1955 peaceful uses conference, the United States and the Soviet Union had participated in a technical conference on the control of peaceful nuclear materials.⁶⁵ During the London conference in summer 1957, Britain's Selwyn Lloyd had advocated forming technical committees to study verification systems. Eisenhower's appointment of Killian as his science adviser and his advocacy of international technical studies indicated his seriousness in pursuing disarmament. In the last analysis, any disarmament agreement would rest on its technical feasibility.⁶⁶

Following the National Security Council meeting on January 6, Killian and Cutler selected an interagency committee to conduct the technical disarmament studies. On the Bethe panel, as it was called, were representatives from the Atomic Energy Commission, the Department of Defense, the Central Intelligence Agency, and the missile panel of the President's Science Advisory Committee. In addition, the Bethe panel called on experts from the Los Alamos and Livermore weapon laboratories and from the Air Force Technical Applications Center. The State Department supplied observers. The Bethe panel focused on three major questions: Could the United States detect both atmospheric and underground Soviet nuclear tests? What were the comparative strengths of the Russian and American nuclear arsenals? What restrictions would a test ban place on the Commission's weapon laboratories?⁶⁷

INTERNATIONAL PRESSURES FOR A TEST BAN

While the Bethe panel launched its technical studies, international pressure for a test ban continued to mount. In Cairo, the Afro-Asian Solidarity Conference called for the end of nuclear testing. Shortly thereafter on January 13, Linus Pauling presented an antitestng petition to the Secretary General of the United Nations. Pauling had now collected more than 9,000

signatures from forty-four countries, including those of 36 Nobel laureates, 101 members of the National Academy of Sciences, 35 fellows of the Royal Society of London, and 216 members and correspondents of the Soviet Academy of Sciences. Because the President had consulted personally with Teller, Pauling requested an appointment for himself. As if to punctuate Pauling's request, on February 1 the Council of the Federation of American Scientists advocated a ban on all testing, even of the smallest weapons.⁶⁸

During the period scientific data on fallout was continuously published. In New York, the fourth session of the United Nations' Scientific Committee on the Effects of Atomic Radiation met from January 27 through February 28 to draft its final report. On the whole, the United States delegation headed by Shields Warren was satisfied that the report on somatic and genetic effects of radiation would refute many exaggerated claims about the hazards of radiation. With the exception of the report's conclusion, the Americans had striven successfully to keep "political" comments from the draft. When the Soviets sponsored a condemnation of testing for the conclusion, the United States succeeded in blocking the move by tabling that part of the report.⁶⁹

The *Bulletin of the Atomic Scientists* devoted its entire January issue to "Radiation and Man," with reports from Libby and Austin Brues as well as an article by Jack Schubert and Ralph Lapp. Under the aegis of Project *Sunshine*, J. Laurence Kulp and his associates from Lamont Laboratory, Columbia University, published new information on strontium-90 in the February issue of *Science*. Kulp and his colleagues concluded that the strontium-90 levels were not hazardous, but they also indicated that the levels of strontium-90 accumulated in human bones, especially children's, had risen measurably since 1956. Pauling then used the data to illustrate dramatically the cumulative millicuries of strontium-90 per square mile in New York City. Although not confirming Pauling's fears, General Alfred D. Starbird, the Commission's director of military application, forwarded to the Commission a warning from the division of biology and medicine that the *Hardtack* tests would produce more worldwide fallout than did Operation *Redwing* in 1956. Given the climate of world opinion, Commissioner Vance thought it unwise for the United States to conduct tests at levels so much higher than previous operations.⁷⁰

HUMPHREY SUBCOMMITTEE

Perhaps the most significant pressure to end testing at this time came from Senator Hubert H. Humphrey's subcommittee on disarmament, which held hearings on the issue from February into April. As early as November 1957, Humphrey had written Eisenhower asking for a more flexible disar-

mament policy. After discussions with Stassen, Humphrey suggested that the United States declare its willingness to negotiate separately on a nuclear test ban with the only condition being agreement on an effective inspection system under United Nations administration. Humphrey was supported in his position by Senators Anderson and Stuart Symington, a former Secretary of the Air Force.⁷¹

Humphrey opened his hearings on February 28 with testimony from Stassen, who had only recently left the Administration. Although Humphrey could not prove it at the time, he suspected that Stassen merely repeated his National Security Council briefing for the benefit of the disarmament subcommittee. Officially, Stassen kept the Administration's confidence, but in substance his Congressional testimony outlined his well-known disarmament plans. There was hardly any secret about Stassen's views or his optimism about the readiness of the Soviet Union to engage in serious disarmament negotiations.⁷²

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In subsequent hearings, the Humphrey subcommittee, with one exception, limited testimony to either representatives of the Commission and its weapon laboratories or members of the Bethe panel. Strauss, Libby, Starbird, and Spofford G. English, acting deputy director of research, all defended the Administration's official policy linking a test ban to other disarmament issues. As they stated repeatedly, the manufacturing and stockpiling of nuclear weapons, not their testing, threatened world peace. According to the Commission spokesman, a test ban would hurt the United States more than the Soviet Union because American testing emphasized the development of defensive weapons. Significantly, Humphrey did not call for testimony from either the State or Defense departments, a fact that no doubt underlined the Commission's increasing isolation on the disarmament question.⁷³

Incredibly, in March 1958 both the Commission and the Russians strengthened the positions of the test-ban advocates; the former inadvertently, the latter perhaps deliberately. On March 6 while Libby testified before the Humphrey subcommittee, the Commission announced that the maximum distance at which its seismological stations had detected the *Rainier* shot was only 250 miles. The implications, if true, were immediately evident and appeared self-serving to the Commission's determination to keep testing. If detection of underground tests were so limited, policing an international test ban would be impossible. During the ensuing controversy the Commission hastily revised its estimates to 2,300 miles, but the damage had been done. In the eyes of Senator Anderson and others, the Commission and Strauss had been discredited by an apparently deliberate attempt to falsify the *Rainier* data. Humphrey, however, was inclined to accept Libby's explanation that the error was an honest mistake made while Strauss was on vacation.⁷⁴ But even an exonerated Commission would now

find it much more difficult to argue the technical difficulties of monitoring a test ban.

The Humphrey subcommittee provided Edward Teller and Hans Bethe still another arena in which to debate America's nuclear weapon policy. Although Bethe was a Nobel laureate, Teller, who had recently become director of the Livermore Laboratory, was no doubt better known to the general public. In February, *Life* magazine had published a preview of Teller's and Albert Latter's *Our Nuclear Future*. In *Life* Teller and Latter also challenged Pauling and his 9,000 scientists who had petitioned the United Nations for a test ban. Before the Humphrey subcommittee, Teller repeated his familiar arguments for the need to test clean tactical weapons and to develop peaceful uses of nuclear explosives. Prophetically, he now raised questions about the reliability of detecting small underground tests and verifying a production cutoff in the Soviet Union. Perhaps unintentionally, Teller delivered a blow to the Administration's August 29 policy when he suggested that it might be more difficult to validate a production cutoff than it would be to monitor tests.⁷⁵

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Bethe's published testimony had been heavily censored, but it was clear in the published version that he acknowledged the difficulties of detecting both underground and high-altitude tests. He also agreed with Teller on the near impossibility of policing nuclear weapon stockpiles, although he was more optimistic about monitoring production. On the matter of testing, however, Bethe broke sharply with Teller and the Commission. Assuming that the United States was well ahead of the Russians in weapon design, variety, and stockpile, Bethe argued that a test ban would be greatly advantageous to the United States. Bethe admitted that if the Soviets cheated on a test ban, they would eventually overtake the United States. But Bethe did not believe the Russians could violate the test ban without incurring unacceptable risks of being detected.⁷⁶ Although Humphrey repeatedly professed his objectivity, it was clear that he was pleased with Bethe's remarks.

The Commission became increasingly nervous about the mounting pressure for a test cessation. During the Humphrey subcommittee hearings, Ramey requested the Commission prepare comments on a bill introduced in June 1957 by Congressman Charles O. Porter of Oregon, who was to become a major critic of the *Hardtack* tests. The bill would have halted United States testing as long as other countries refrained. Although Porter's bill stood little chance of passage, it irritated the Commission. Commissioner John S. Graham described his own opinions on testing as "tentative." Commenting on the Porter bill, Graham concluded that it was not wise to prohibit testing through legislation but that "some reasonable limitations on testing [were] so important that we should use every vehicle . . . to discuss these issues." At the Humphrey hearings Commissioners Gra-

ham, Floberg, and Libby agreed that disarmament and *imminent* test cessation were the most important issues facing the Commission.⁷⁷

TEST BAN ALTERNATIVES

476 Even Strauss recognized that a new disarmament policy was inevitable. To complicate matters for the Commission, during the fall and winter of 1957–1958 Strauss moved to the periphery of the disarmament discussion, almost as a messenger among Eisenhower, Dulles, and the Congress. Shortly after the National Security Council meeting on January 6, Strauss presented Eisenhower with an idea he had discussed with Dulles. Strauss's new approach would retain the linkage between a test ban and a production cutoff. He advocated closing down all production plants to ease the inspection problem and disassembling existing weapons to provide fissionable material for power and other peaceful needs; therefore, all nuclear weapon stockpiles would be reduced. According to Strauss, General Manager Fields and Starbird agreed that the proposal could be "far more easily inspected" than earlier ideas. Strauss recommended trying the arrangement for three years, after which, if the agreement worked out, testing could be resumed "for peaceful purposes only." Eisenhower liked the idea and encouraged Strauss to pursue it.⁷⁸

After reviewing sentiment in the United Nations and the Administration, even Fields acknowledged that the Commission should develop an acceptable fallback position. He appointed an ad hoc disarmament committee of senior Commission staff to propose alternative policies. The committee identified ten possible alternatives, or variations thereof, but no two committee members were able to agree on a single recommendation. From the committee's perspective, all alternatives had considerable disadvantages. The committee concluded,

Which one, therefore, is to be accepted is a function of how desperately we need make a new proposal and what we desire to achieve thereby:—taking a real disarmament step; making a proposal the Soviets might accept; making a proposal designed merely to give us propaganda advantage; or making a proposal to satisfy neutrals relative to fallout; or a combination of these.⁷⁹

The committee's note of desperation accurately depicted the Commission's frustration at being unable to maintain its grip on the Administration's disarmament policy.

The Commission's first priority, obviously, was to continue testing as long and as intensely as possible. Starbird outlined plans to conduct a harbor excavation experiment in Alaska in 1959. Furthermore, he predicted that in the near future the United States would adopt a policy of

continuous testing, perhaps conducted completely underground. Libby enthusiastically endorsed greatly increasing underground testing. Yet even the possibility that the Commission might save the testing program by moving it underground was coolly received by Fields, who noted several limitations that could never be overcome—primarily the inability of testing complete weapon systems underground.⁸⁰

THE BETHE PANEL REPORTS

While the Commission searched ineffectively for a solution to the disarmament dilemma, the Bethe panel proceeded to evaluate the technical feasibility of monitoring a test suspension and the comparative losses to the United States and the Soviet Union as a result of test cessation. Given the interagency composition of the committee, the Bethe panel reached rather modest conclusions by late March 1958. The Commission's representatives who signed the report found little reason to complain. The Bethe panel described "a practical detection system" that would identify nuclear explosions in the Soviet Union, except for very small underground shots. The system would require observation stations, mobile ground units, and rights to fly over parts of the Soviet Union. The panel did not recommend suspension of the *Hardtack* tests and conceded that a test ban would result in some deterioration of the weapon laboratories. The United States, according to the panel, could benefit from additional testing—especially clean and small, inexpensive weapons. Finally, the panel was not able to estimate whether a test ban would be to the net military advantage of the United States.⁸¹

Clearly Bethe's thinking, supported by Herbert Scoville of the Central Intelligence Agency, dominated the panel. Starbird and General Herbert B. Loper firmly opposed even the panel's moderate report, but the Department of Defense failed to take a strong stand on the military consequences of a test ban, although in a separate action Quarles forwarded Maxwell D. Taylor's objection to breaking the disarmament linkage. As a result, the Bethe panel left the door open for the President's Science Advisory Committee to make its own estimate on the comparative consequences of a test ban.⁸²

THE SOVIET UNILATERAL TEST SUSPENSION

The second boost for the test-ban advocates in March came from the Soviet Union. On March 31, after completing one of the most intensive test series in history, the Supreme Soviet announced it would suspend all Russian atomic and hydrogen weapon tests and appealed to the United States and

United Kingdom to do likewise. From the American perspective, the Soviet announcement was a cynical, yet brilliant, propaganda ploy. Since autumn 1957 the Russians had been testing at an unprecedented rate, sometimes detonating two or more shots in a single day, so that global fallout levels had risen sharply by spring 1958. Bethe even speculated before the Humphrey subcommittee that the Russians had rushed to finish their tests before the United States began the *Hardtack* series. Nevertheless, the Soviet action won worldwide acclaim, especially in Asia and Africa.⁸³

478 The United States was not caught unawares, but that fact hardly blunted the impact of the Russian announcement. On March 24, Eisenhower met with his senior advisers to work out a response to the impending Soviet declaration. Secretary Dulles suggested that the President beat the Russians to the punch by immediately announcing that the United States would suspend all testing for two years after the *Hardtack* series. Strauss and the Department of Defense representatives were strongly opposed, warning that the NATO allies would conclude that the United States was frightened. On second thought, Dulles agreed that Macmillan and Adenauer could be embarrassed if an apparently panicked United States were to play into the hands of its political enemies. Strauss now offered the plan that he had discussed with the President in February: a two-year test suspension and production cutoff accompanied by a pledge to reduce weapon stockpiles by using the nuclear material "to meet the needs of a power-hungry world." The trouble with Strauss's proposal was that it too would require prior consultation with the NATO allies. It was frustrating that, although the Americans knew the Russian announcement was imminent, the Administration could do nothing about it.

Stymied over how to soften the Russians' propaganda blow, Eisenhower nonetheless drew renewed resolve from the incident. For the first time in their history, he reflected, Americans were really "scared" by the tremendous power of nuclear weapons. For Eisenhower, it was "simply intolerable" for the United States to lose its moral leadership of the free world. For one thing, he speculated, the United States could confine its testing underground. For another, if Congress amended the Atomic Energy Act and the Soviets accepted inspection, a nuclear test suspension would be inevitable. Whatever the outcome, he directed his defense and security advisers "to think about what could be done to get rid of the terrible impasse in which we now find ourselves with regard to disarmament." The Administration was now on notice that the President would soon revamp the United States' disarmament and test-ban policies.⁸⁴

Eisenhower met with the National Security Council on April 4 to discuss the Bethe panel's report. Noting that some areas of the Soviet Union have more than 140 earthquakes a year, Eisenhower asked Bethe whether underground tests in the ten-megaton range could be distinguished from earthquakes. Bethe could not provide a definitive answer, but he estimated

that seismologists could tell the difference most times. Dulles was surprised that as many as thirty checkpoints would be required in the Soviet Union and wondered how many would be needed in the United States. Bethe thought perhaps fifteen. What if, Dulles interjected, the Soviets wanted to include all of the Western Hemisphere? Dulles was also skeptical that the Russians would accept the proposed overflights. Bethe did not think the number of checkpoints was critical so long as some kind of mobile inspection team could insure against cheating. Again Eisenhower voiced his worry about the tension gripping the free world over the nuclear testing issue. In the President's judgment, the United States faced a steady psychological erosion of its leadership on disarmament.⁸⁵

In this climate of mounting gloom over America's ability to provide moral leadership to the Western alliance, Khrushchev asked Eisenhower to join the Soviet Union in a test cessation that would ease the fears of "all strata of society, from political personages, scientists, and specialists to ordinary people, the rank-and-file workers of city and village, to mothers of families." Gallingly, Khrushchev cited Pauling's United Nations petition signed by scientists from the United States and the Soviet Union as a testament against allowing continued nuclear tests, "thereby causing harm to the health of people throughout the entire world and threatening the normal development of coming generations." Hastily, Dulles prepared a presidential reply, little more than a holding action. In addition to the old formulas, the President's note repeated his January 12 proposal that technicians from both countries work cooperatively to develop workable control measures. To reporters, Dulles explained that the Soviet unilateral declaration was propaganda, pure and simple. Because the Russians knew of the planned *Hardtack* series, their promise to stop testing only if others followed suit was a transparent ploy requiring neither self-denial nor even hesitation in their own testing program. Nevertheless, by summarizing the Bethe panel's conclusions, Dulles also signaled that the Administration had its own technicians hard at work searching for an acceptable disarmament policy.⁸⁶

When Eisenhower met with reporters on April 9, he had already reviewed his position on disarmament with Dulles. To questions about the Bethe panel and Killian's group, he replied with the characteristic vagueness that he often used with the press. But when asked directly whether he would consider a test suspension if the scientific reports were favorable, he answered "yes" without hesitation. In fact, he said he might even suspend tests unilaterally. Strauss was flabbergasted and immediately called Dulles to find out if the President and the Secretary of State were in collusion on the testing issue. Dulles assured Strauss that nothing was prearranged with the President. Angrily, Strauss complained that he was having great difficulty keeping "his ducks in a row." No doubt he was also upset that Killian and Bethe were steadily gaining influence within the President's inner circle.⁸⁷

That same week the President's Science Advisory Committee met in Puerto Rico to evaluate the Bethe panel report. On the question of the comparative military advantage of a test suspension, the Killian committee filled the void left by the Bethe panel by concluding that an end to testing by both sides would "freeze the edge" the United States had in nuclear weapon technology. The committee did not challenge the need to complete the *Hardtack* series but believed that it would be in the United States' interest to break the linkage binding a test ban to other disarmament proposals. Finally, given the controversy over the reliability of technical detection systems, the Science Advisory Committee recommended further studies of monitoring techniques, perhaps in cooperation with the Soviets.⁸⁸

THE COMMITTEE OF PRINCIPALS

To provide guidance for a possible summit meeting, Eisenhower established a special Cabinet committee consisting of Dulles, as chairman, along with Strauss, Secretary of Defense Neil H. McElroy, and Secretary of the Treasury George Humphrey. In turn, on April 7 the White House appointed a committee of principals, a working group on disarmament policy comprising the Secretaries of State and Defense, the chairman of the Atomic Energy Commission, the director of the Central Intelligence Agency, and the President's science adviser. With Dulles in command, the State Department prepared a revision of the disarmament policy paper approved by the National Security Council on June 11, 1957; the paper was to guide subsequent discussions.⁸⁹

The principals labored through mid-April without agreeing on specific new United States initiatives on disarmament. In general, they found the United States' policy adequate in scope and objective, but they differed on whether the various components of American disarmament policy could be separated. Consequently, United States policy appeared complex, rigid, and vulnerable in world opinion. The Department of State, the Central Intelligence Agency, and Killian's group favored a separate, inspected test ban. The Commission, on the other hand, indicating that it was bending, proposed a limitation on testing, rather than an outright ban. According to the Commission's formula, atmospheric tests would be limited to twenty per year having no greater yield than 100 kilotons each while underground tests would be unrestricted. The Commission also continued to insist that a test limitation agreement be linked to some other disarmament measure, although not necessarily a production cutoff. The Defense Department remained noncommittal in the discussion.⁹⁰

On his return from Puerto Rico, Killian met personally with Strauss to review his committee's recommendations. Strauss was surprised that Killian presented the views of the entire committee, not just the Bethe panel.

Killian quickly got to his major contention: that because the United States was technically ahead in weapons, a mutual test suspension would be advantageous to the United States. Bluntly, Strauss told Killian he could not agree. Although Americans believed they were ahead, Strauss was not convinced. In any event, the United States' lead was only relative, based on the development of smaller, lighter weapons. Because the United States was a democracy, Strauss argued, it was a defender nation, not an aggressor like the Soviet Union. Thus, while the Soviets could concentrate on developing large thermonuclear warheads, the United States would have to develop more sophisticated weapons. Historically, he continued, with the advent of new weapons, countermeasures were always devised but sometimes lagged for years. Strauss conceded that a test ban seemed attractive, but with "defensive atomic weapons . . . in their infancy" an end to testing "would be purchased at an intolerable cost to our security." According to Strauss, Killian was surprised, shaken, and uncertain as to what to do next.⁹¹

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Killian's confusion, no doubt, was short lived, especially after his April 17 meeting with Eisenhower from whom he received encouragement for the Science Advisory Committee's recommendations. Killian hoped that the United States could suspend testing after the *Hardtack* series, but conscientiously he reported the continued opposition of the Commission and the Defense Department. The President confided in Killian that he had not been very impressed, or even convinced, by the pleas of Teller, Lawrence, and Mills for continued testing of clean and defensive weapons. Obviously, similar justifications from Strauss and Quarles were also wearing thin. Again, on April 22, Khrushchev wrote Eisenhower a long, stentorian letter in which he reviewed all past differences over disarmament and piously concluded with a call to "put an end to polemics on this subject."⁹² This time, with advice and assistance primarily from Dulles, the President would be ready with a different reply for the Russian premier.

DULLES'S DISARMAMENT ADVISERS

At his home on April 26, Dulles convened a critical meeting of his four personal disarmament advisers and the committee of principals. Dulles's advisers, all close friends of Eisenhower's, included General Alfred M. Gruenther, former NATO commander; Robert A. Lovett, Truman's Secretary of Defense; John J. McCloy, civilian head of German occupation; and General Walter Bedell Smith, Eisenhower's former chief-of-staff. Dulles set the tone in his opening remarks, stressing the urgency to do something to erase the widely held image of the United States as a militaristic nation. In Dulles's opinion, the continued military emphasis probably caused the United States to lose more friends than the gain from small technical mili-

tary advances was worth. The United States, he said, now had no choice but to demonstrate the nation's interest in peace and arms control.

Dulles reviewed the various elements of the disarmament package. On testing, he summarized the views of the Science Advisory Committee, the Commission, and the Department of Defense. He also observed that the British were not only committed to complete their scheduled 1958 tests but also would not give up testing unless American weapon technology could be made available through an amendment of the Atomic Energy Act. On the production cutoff, Dulles reluctantly reported that the Strauss proposal for cannibalizing stockpiles for fissionable materials was dead. Strauss and Quarles repeated their objections to a test ban, while Killian reviewed the recommendations of the Science Advisory Committee. None of Dulles's four advisers took a clear-cut stand for or against a test suspension; indeed, they appeared to believe that suspension was a foregone conclusion. The forum was ideal for Dulles, however, because it enabled him to set a new course for the Administration without obtaining the formal concurrence of the Commission and the Defense Department through the National Security Council.⁹³

Following his Saturday conference, Dulles worked rapidly on a reply to Khrushchev's latest note. By Monday, April 28, 1958, he had drafted Eisenhower's response. "The United States is determined that we will ultimately reach an agreement on disarmament," the President wrote. While he reiterated the United States' concerns for a production cutoff, a stockpile reduction, a test cessation, Open Skies, and the peaceful use of outer space, Eisenhower merely alluded to the "interdependence" of these issues without insisting upon their linkage. Rather, he stressed the need for technical studies of inspection and control, such as those called for by the United Nations General Assembly. Technical studies on test detection, for example, could serve as a vital first step to a political agreement. Significantly, the President made no mention of technical studies relative to production cutoff and left vague whether the United States was still bound to the August 29 disarmament proposals.⁹⁴

PLANNING FOR HARDTACK

While the Eisenhower Administration reevaluated its disarmament policies, the Commission continued its planning for Operation *Hardtack* at the Enewetak Proving Ground. On January 31, 1958, Eisenhower had approved modified plans for *Hardtack* that included several tests of various missile warheads. In the aftermath of *Sputnik*, the Commission and the Department of Defense considered these tests essential, but the two agencies disagreed on the advisability of two high-altitude shots. Strauss vehemently opposed detonating the high-altitude shots because the tests might

blind the islanders on nearby atolls. After the experience of *Castle-Bravo* the Commission did not want to risk another test fiasco. More important, mindful of the United States' role as United Nations' trustee for the islands, Strauss believed that it would be immoral to gamble with the health and safety of the Marshallese. He maintained that the cost of moving the two shots northeastward to Johnston Island would be minimal compared to the risks of testing at Enewetak. Despite Killian's support of the Defense Department, Quarles was unable to overrule Strauss's objections when they met with Dulles, McElroy, and Twining on April 7. The extra cost and delay notwithstanding, the two shots were eventually moved to Johnston Island.⁹⁵

No sooner had agreement been reached on the Johnston Island tests than the Department of Defense proposed three additional high-altitude tests in a new series named *Argus*, to be fired 300 miles over the South Atlantic. The principal purpose of the *Argus* tests, scheduled for August and September 1958, was to test the "Christofilos effect," in which electrons from high-altitude bursts were captured by the earth's magnetic field resulting in some interference with radio, radar, and other communication systems. Eisenhower approved the additional *Argus* series on May 1, significantly with the concurrence of the Commission, the Departments of Defense and State, and Killian.⁹⁶

The weapon laboratories also pushed hard to accelerate the testing programs through spring and summer 1958. With the prospect of a moratorium for two or more years, the laboratories stepped up experiments and expenditures wherever possible. When Eisenhower approved *Hardtack*, he had deferred a decision on an underground series for the Nevada Test Site during fall 1958. With continued pressure from the laboratories and the Commission, Eisenhower finally approved the underground series, originally called *Millrace*, on June 13. As the test suspension became more and more a certainty, the Commission and Defense carried forward requests for additional shots including balloon, tunnel, and safety tests in Nevada. The testing pace became so frenetic that Eisenhower did not finally approve *Hardtack II*, as the series was now called, until late summer.⁹⁷

DEMONSTRATIONS AGAINST TESTING

As the government intensified its weapon experiments, protestors also intensified their efforts to halt testing. On the twelfth anniversary of the bombing of Hiroshima, a small Quaker group, calling itself the Committee for Non-Violent Action Against Testing, set up camp outside the gates of the Nevada Test Site near Mercury. By twos and threes the protestors attempted to enter the test site but were stopped by the sheriff of Nye County, who arrested them for trespassing. During that fall, small groups of pacifists

and political activists formed the National Committee for a Sane Nuclear Policy, later simply called SANE. In 1958 SANE was especially active in lobbying the Humphrey subcommittee for a Congressional test-ban resolution. Tactically, the leaders of SANE decided to focus their energies on the testing issue, rather than to confront the entire disarmament question.⁹⁸

In February 1958, Strauss received reports that Lawrence Scott and the committee for non-violent action planned to sail to the Pacific Proving Ground in hopes of stopping the *Hardtack* tests. The voyage of the *Golden Rule* would obviously be symbolic with no chance of actually halting the shots. Nevertheless, by actually putting themselves at risk, the crew hoped to remind the world of the *Lucky Dragon's* fate and thus quicken the world's conscience. The *Golden Rule* did not sail more than a mile and a half from Honolulu before it was detained by the Coast Guard on May 1. Although largely ignored by the Commissioners, the "voyage" of the *Golden Rule* succeeded in capturing public and press attention.⁹⁹

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Less dramatically, but more personally, the committee for non-violent action brought its protest to the Commission itself. On May 7, a group of pacifists led by David Dellenger and Theodore Olson walked into the lobby of the new Commission headquarters building in Germantown, Maryland, to announce that they would remain there fasting until they could speak to the Commissioners. Among the group were the wife and child of a crewman on the *Golden Rule* and a protestor who had fallen ill and failed to catch the boat before it left California. No doubt the demonstrators expected to be arrested for trespassing, but to mute publicity the Commission decided they could stay in the lobby or the adjacent auditorium indefinitely. Strauss even provided cots, blankets, a telephone, and a washroom for the group. Sandwiches, coffee, and soft drinks were offered, and the protestors, newsmen, guards, and employees eventually became friendly. Still, Dellenger and his colleagues pledged to maintain their fast and vigil in the lobby until they could speak personally to the Commissioners.

For a week they waited. First, Graham volunteered to see the group on behalf of the Commission. The meeting was cordial but not satisfactory for Dellenger. The demonstrators decided to hold out, in part to learn the fate of their family and friends on the *Golden Rule* but mostly to present their views to the entire Commission or at least to Strauss.

Finally, Strauss agreed to talk with the group in one of history's most unusual confrontations between antiwar protestors and a government official. Appealing to the moral force of the Christian-Judaic tradition and to the nonviolent principles of Ghandi, the pacifists asked Strauss and the Commission to abandon their preparations for nuclear war. For the most part, the exchange continued on this high moral and ethical level. Strauss's conscience was moved, and he reflected that prior to World War II when he was in the banking business he had refused, on moral grounds, to invest

in either munitions or distillery businesses. But the subsequent holocaust of World War II had convinced him that only America's great nuclear deterrent had saved the world from communist domination.

The demonstrators disagreed, claiming that a nation under God should not have fought even against the Nazis. Strauss was nonplussed, and the courtly southern Jew rhetorically asked whether the Civil War, which freed the slaves, was justified. No, replied one northern pacifist; "the body is nothing," and only the freedom of the spirit mattered. Indeed, the blacks might have been freer had there not been a Civil War. No American war, not even the Revolution, had been justified. If the Commission could not by itself end nuclear testing, then mindful of the Nuremberg trials the pacifists stated that Strauss and everyone who worked for the Commission should resign.

Here the dialog virtually ended. Unknown to the demonstrators, Strauss had already resigned; and so with some irony he noted that America was still a free country, that Commission employees could work wherever they wanted but that most worked for the government out of a sense of duty as citizens. Not surprisingly, the confrontation ended inconclusively, albeit amicably. Within weeks, Dellenger and his friends were back in Washington, D.C., to protest in front of the White House and to rally near the Washington Monument where Pauling demanded an end to nuclear testing.¹⁰⁰

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UNDERGROUND TESTING: A REFUGE

By May 1, 1958, even the most ardent supporter of nuclear defense knew that the days of atmospheric testing were numbered. Thus, while the protestors camped in the lobby of the Germantown headquarters building, the general advisory committee met in the Commission's Washington offices to discuss the future of nuclear weapons. Although Defense officials continued to support the Commission over the President's Science Advisory Committee, the Commission asked the general advisory committee: "How completely could our weapons program go forward if we were to be limited to underground tests only?" For two days the general advisory committee wrestled with that issue.¹⁰¹

Edward Teller took the lead in pressing the committee to consider the effects of a test moratorium after *Hardtack* upon the laboratories, the Commission, and the United States. Although Teller thought a complete moratorium would have serious consequences, he ventured that "an intermediate position," including underground, high-altitude, and a limited number of atmospheric peaceful tests might actually be desirable. Because absolute verification of a test ban would be impossible, Teller wanted the general advisory committee to endorse a position that would allow

the development of peaceful nuclear explosives and anti-ballistic-missile warheads.

Speaking from the perspective of the President's Science Advisory Committee was James B. Fisk, a prominent physicist and former director of research at the Commission. Fisk emphasized the "broad" issues relating to a test moratorium; something would have to be done to calm public fears over atmospheric contamination. More important, Fisk viewed "some kind of test moratorium" as an initial step in reducing world tensions and stopping the arms race. Fisk had to leave, however, before the advisory committee adopted Teller's proposals for confining all tests underground with the exception of limited peaceful "ditch-digger" and antimissile tests. "The Committee is unanimously agreed that to go any farther than this in the restriction of testing would seriously endanger the security of the United States."¹⁰²

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Events were moving quickly on May 14 when Strauss met with the President. Already on May 9 Khrushchev had accepted Eisenhower's invitation to join technical disarmament studies. With Macmillan due to visit Washington in early June to confer on an exchange of nuclear weapon information, among other things, the prospects of a test moratorium were even more certain. The President and Strauss spoke briefly on the status of peaceful uses, whereupon Eisenhower asked Strauss to be his special adviser on Atoms for Peace under Dulles in the State Department following his term as chairman of the Commission. Strauss was delighted, especially if that meant he would remain within the "NSC family." On disarmament, Strauss reported that the general advisory committee was completely at variance with the conclusions of the Killian report, particularly on the matter of the superiority of American nuclear weapons. According to the committee, American defensive systems were not so advanced as Soviet offensive weapons. Eisenhower listened but offered no comment.¹⁰³

Strauss gave Dulles a copy of the general advisory committee's report the following day. If the suspension of atmospheric tests following *Hardtack* were politically necessary, Strauss hoped that testing could be moved underground. Dulles commented that the British, too, would like to end testing by phases so that they could continue to develop "small" weapons of less than one megaton. Much depended on whether Congress approved an amendment to the Atomic Energy Act to permit exchanging weapon data with the British. Dulles also expressed his regret on Strauss's pending retirement from the Commission. With the President, Dulles encouraged him to become "ambassador-at-large" on Atoms-for-Peace matters.¹⁰⁴

On May 24, Eisenhower wrote Khrushchev to propose convening the technical disarmament conference in Geneva within three weeks of the Soviets' acceptance of the invitation. He suggested inviting scientists from the United Kingdom, France, and other nations having experts on detecting

nuclear tests. Eisenhower stressed the importance of selecting scientists "chosen on the basis of special competence, so as to assure that we get scientific, not political, conclusions." To minimize political maneuvering, he suggested that the conference draft an initial progress report within thirty days and prepare its final report within sixty days. When Khrushchev accepted on May 30, asking that Czechoslovakia, Poland, and India be included in the conference, the stage was set for the conference of experts, with the exception of India, to convene in Geneva on July 1.¹⁰⁵

With the President now moving resolutely toward a moratorium and technical discussions of methods of policing such an agreement, the Commission made one more effort to keep open the option of underground testing. On May 28, the Commissioners met with laboratory representatives to discuss limiting weapon tests to underground shots. Commissioner Graham reviewed the recent events, including the reports of the general advisory committee and the advisory committee on biology and medicine. General Starbird asked the laboratory directors what technical problems were involved and what limitations would result should the Commission decide to test underground only.

Again taking the lead, Teller responded that scientists at Livermore had concluded that nearly all required information could be obtained from underground tests, which were easier to conduct than atmospheric tests. Even without an international moratorium, Teller was in favor of moving almost all tests underground, with exception of those for weapon effects and antimissile systems, which had to be atmospheric. He proposed to limit the amount of radioactive material released into the atmosphere by each nation to that produced by one-tenth of a megaton of fission weapons annually. He also noted that the development of peaceful nuclear explosives would be hampered by abandoning atmospheric testing.

Duane C. Sewell of Livermore saw considerable advantages to testing underground. It would allow the laboratories greater flexibility in scheduling tests and thus accelerate the development of new weapons. Instead of waiting for the annual test series, which was subject to the vagaries of weather, continuous underground testing would allow laboratory scientists to experiment when they were ready. Sewell envisioned that more radical weapon designs could be tested because the failure of an experiment would not be so important. Rather than waiting another year, the test would simply be rescheduled. Sewell predicted significant cost savings as well, particularly if the Commission eliminated the expensive biannual tests at the Pacific Proving Ground. According to Sewell, the cost of digging the tunnel for the *Rainier* shot was no more than the cost of a five-hundred-foot tower. Furthermore, the cost of additional tunnels would be about one-fourth the cost of the original. Finally, public opposition to tests because of the fallout danger could be eliminated by underground testing.

Norris Bradbury and Alvin C. Graves from Los Alamos were not as

sanguine as their Livermore colleagues about the advantages of underground testing, but even Bradbury was not certain that the final "proof-test" of a missile system and its warhead was "absolutely necessary" if the two could be adequately tested separately. Although the Commissioners did not at this time actually decide to abandon atmospheric testing, the laboratory scientists, and particularly Teller and Sewell, had assured themselves that they could move all tests underground with little sacrifice to the weapon program.¹⁰⁶

488 Within the atomic energy establishment underground testing seemed a viable, and perhaps preferable, alternative to a moratorium or an outright ban on nuclear tests. Eisenhower, however, was not ready to accept that easy solution. Five years in the White House had taught him that compromises of this kind merely postponed the realization of his fervent hopes to remove the nuclear threat that hung over the world. Underground testing might help the situation if a moratorium or test ban proved impossible, but in the meantime the President focused his attention on the technical conference of experts, soon to convene in Geneva. Perhaps the scientists could cut through the political tangle and determine whether limiting tests was technically feasible.