Chapter III

The Conference of Experts

I

The Context—1958

The developments which began to take shape in 1957 continued their course with little change in the first half of 1958, and predetermined in large measure both the nature of the next negotiating forum and the subject matter for the negotiations.

Due to the refusal by the Soviet Union to accept the new composition of the United Nations Disarmament Commission, there was no agreed forum for continuing arms control and disarmament negotiations. In mid-February the Japanese government began to explore with other governments the possibility of convening a meeting of the Disarmament Commission, but this initiative was abandoned when on March 14, the USSR reiterated its refusal to participate in the Commission as long as the majority of its members belonged to Western military alliances. The impasse thus remained and could not be broken within the context of the decisions of the twelfth Assembly.

The pressure against the testing of nuclear weapons also continued unabated. Indeed, on the first day of 1958, the Afro-Asian Solidarity Conference, meeting in Cairo, adopted a declaration which among other things called for a cessation of further tests.1 On January 13, Linus Pauling presented his petition urging an immediate accord to halt tests, now signed by more than nine thousand scientists from forty-three countries, to the Secretary General of the United Nations. On February 1, The Council of the Federation of American Scientists adopted a statement favoring a test ban which would cover even the smaller nuclear weapons and asserting that an appropriate control system could easily be established.2

From the point of view of the American Administration, perhaps the most significant pressure was that engendered by Senator Hubert H. Humphrey's Subcommittee on Disarmament. This group held a series of hearings in February, March, and April, which will be considered in detail later, to explore the question of a nuclear test ban. Although the Subcommittee ostensibly approached the matter without a prior commitment to any position, at least some of the Senators clearly thought that the hearings should serve primarily to demonstrate the feasibility of developing a control mechanism for policing a test ban and also the wisdom of attempting to negotiate a separate agreement on this issue. The Chairman, Senator Humphrey, had, after all, written to the President urging such a course as early as November 1957. Senator Humphrey obtained strong support for his views in the hearings from Senators Stuart Symington, a former Secretary of the Air Force and a leading Congressional expert on military affairs, and Clinton Anderson, Vice-Chairman of the Joint Committee on Atomic Energy.

On the other hand, the forces which operated in the opposite direction also continued unabated. Some scientists and policymakers asserted that further testing would result in breakthroughs for "defensive" weapons, and in discoveries that would lead to important peacetime uses of nuclear energy. In the latter connection, the Atomic Energy Commission, which was consistently concerned lest a test ban impair weapons development, now also stressed the importance of its Project Plowshare, a continuing series of experiments designed to explore the peaceful uses of nuclear explosions for such purposes as building harbors or canals. It is important to realize that there has always been a significant link between the Plowshare experiments and the attempt to achieve "clean" bombs or neutron weapons, for using nuclear detonations as a means of excavation would be practical only if one could minimize the radioactivity resulting from the detonation. Planners in Project Plowshare have always counted on the availability of "clean" bombs. Put in another fashion, the Plowshare experiments could have been in the very forefront of nuclear weapons

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research since they involved minimizing the amount of fission products in nuclear explosions.

Edward Teller, at that time Associate Director of the University of California Radiation Laboratory, was the most forceful and articulate exponent of the case for further testing. Although he expounded his views in various forums, his most complete exposition was in a book entitled *Our Nuclear Future*, 4 which he wrote jointly with Albert Latter, a physicist employed by the RAND Corporation, an independent research organization supported principally by contracts from the Air Force. In their book, the two men minimized the danger of radioactive fallout, and argued the need for continued testing.

So far as the North Atlantic Treaty Organization was concerned, the events of early 1958 were a logical outgrowth of the decisions of the previous fall. In pursuance of these decisions atomic weapons were to be stocked on the territory of certain NATO countries, under the custody and control of United States military forces, to be turned over to NATO forces on the outbreak of hostilities at the direction of the President. Selected NATO countries were to be furnished missiles to which the atomic warheads might be attached, although the warheads would remain in American custody until the President authorized their transfer. Thus the actual use of the nuclear components of the weapon systems was to be dependent on an American decision.

The implementation of this plan was impossible under existing United States legislation. Consequently, the Atomic Energy Act of 1954 was amended on July 2, 1958. 5 The amended act authorized the transfer of the non-nuclear parts of atomic weapon systems and the communication of sufficient information to enable non-United States forces to handle atomic warheads, attach them to missiles, and monitor them prior to launching. The non-nuclear parts of atomic weapon systems could be transferred only to an individual nation and subject to the condition that "such transfer will not contribute significantly to that nation’s atomic weapon design, development, or fabrication capability." Information could

be communicated either to a nation or to a regional defense organization such as NATO.

Another important innovation of the amended act was the authorization to transfer nuclear material for use in atomic weapons and non-nuclear parts of atomic weapons, and to communicate design information required for the fabrication of the nuclear core and assembly of the weapon. However, such cooperation could be undertaken only if the recipient nation had "made substantial progress in the development of atomic weapons."

Congress intended to limit the benefits of these provisions to the United Kingdom through this caveat. Although Congress clearly did not wish to encourage additional nations to achieve production capability, the caveat in a sense put a premium on developing independent production capability and may have served as a goad to the French nuclear weapons program. In addition, it probably added to General de Gaulle's bitterness toward the "Anglo-Saxons" at a time when, restored to power in the context of a military rebellion, the General began to shape a program for his Fifth Republic in which an independent force de frappe was to play a crucial role.

On July 3, the day after the amended act came into effect, the United States and the United Kingdom signed an Agreement for Cooperation. This agreement authorized the communication of information concerning non-nuclear parts of atomic weapons systems and information concerning nuclear reactors for military purposes. It also authorized the transfer of a nuclear submarine propulsion unit with its nuclear fuel. The following year the agreement was amended and the United Kingdom was in effect authorized to receive all of the component parts of an atomic weapon except its fabricated core. Agreements for cooperation concerning military applications of nuclear energy as permitted under the 1958 amendments were also signed with Canada, the Federal Republic of Germany, France, Greece, Italy, the Netherlands, and Turkey.

6U.S. Department of State, Treaties and Other International Acts Series No. 4078 (1958).
7U.S. Department of State, Treaties and Other International Acts Series No. 4267 (1959).
8Ibid., Nos. 4271, 4276, 4268, 4292, 4764, 4277, and 4278. A second agreement was signed with France in 1961: ibid., No. 4876.
While their provisions varied, none provided for an extensive collaboration as did the Anglo-American accord.

During the spring of 1958, NATO planners laid the groundwork for the employment on NATO bases of medium and intermediate range ballistic missiles which would be equipped for nuclear warheads, and in June the first consignment of Redstone missiles was shipped to Europe for stationing in West Germany. The first shipment of Thor missiles for delivery to the United Kingdom forces was received in September 1958. But these actions could hardly be called more than the implementation of the joint United States-United Kingdom communique of October 1957 and the NATO Council decision in December of that year. Moreover, they did not involve dispersing nuclear weapons capability to "nth countries." Whether or not they adequately anticipated the new role of continental Western Europe restored in its economic and political power, though, is another question.

Because of the nature of these decisions NATO continued to be plagued by a crisis concerning its strategic doctrine. Nothing had been done to raise the level of the Alliance's conventional forces and thus to increase its capability to defend itself without resort to nuclear weapons; little had been done to increase the participation of the continental allies in the general policy-making within NATO; and the defense of Europe by nuclear weapons continued to depend on either an American or a British decision to use such weapons—a situation which was to prove entirely unacceptable to France and which had already and would continue to cause considerable concern elsewhere on the continent. Furthermore, the nuclear weapons then available if employed in Europe would cause so much contamination that they would have limited usefulness in tactical situations. The crisis in military planning in NATO therefore created two pressures against the cessation of nuclear weapons tests. First, it tended to provide an added argument for the French program to develop an independent nuclear capability, which, given the legal and other inhibitions against the transfer of nuclear weapons, probably could not be achieved without testing. Secondly, it also provided an argument for the development of "clean" nuclear

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weapons, and possibly a neutron bomb, which presumably would also require continued tests.

In summary, in early 1958, American policy-makers were faced with roughly the same pressures and factors operating for and against the continued testing of nuclear weapons as they had been in 1957.

II
The Development of American Policy

The Correspondence Between Heads of States

In the months immediately preceding the Conference of Experts, American policy concerning the cessation of nuclear weapons tests was expressed principally in a series of exchanges of correspondence between President Eisenhower and the Chairman of the Council of Ministers of the USSR, Nikolai A. Bulganin until March 1958 and Nikita S. Khrushchev thereafter.

Within the United States government this exchange was treated primarily as an exercise in communications. The principal criterion determining what should be said appears to have been the estimated impact of a given position on public opinion. In the process, decisions were made which resulted in quite far-reaching and perhaps unforeseen consequences. American policy, as expressed in this exchange of letters, was not based on any considered and agreed position with respect to the interests of the United States, as was for instance the later decision to continue the 1958 American test series, nor was there any contingency planning concerning what the United States would do if certain of its proposals were adopted.

The exchange began with a letter which Chairman Bulganin sent to President Eisenhower on December 10, 1957. In it, Bulganin dwelt at length on the dangers which he felt would result from dispersing nuclear weapons, and especially those which he foresaw if West Germany were to be armed with nuclear weapons. His comments were clearly aimed at the agenda of the NATO Council meeting. After reviewing the state of disarmament negotiations, he made a variety of proposals, of which the following were

the most important for the issue of nuclear testing. First he sug-
ggested that the three nuclear powers should agree to stop further
tests of nuclear weapons as of January 1, 1958, for a period of
from two to three years. Secondly, he proposed that no nuclear
weapons should be stationed in Germany, either the Eastern or the
Western portion. He stated that if the Federal Republic of Germany
and the Democratic Republic of Germany would agree neither to
produce nuclear weapons nor to have them stationed on their ter-
ritory, Czechoslovakia and Poland would also take similar action.
Finally, Chairman Bulganin suggested that these matters could all
be resolved at a summit conference, and he stated his willingness
to have a personal meeting with President Eisenhower.

The President did not reply immediately, and his answer came
in sections. Indirectly, he gave a partial answer through his pro-
posals at the NATO Council meeting, which, as we have seen,
eventually involved stationing nuclear warheads for missiles in
Europe, including Western Germany, although these would remain
under American control. In addition, on December 15, he stated the
American position on nuclear testing in a letter addressed to Prime
Minister Nehru.11 The essence of his statement is contained in this
excerpt:

. . . I do not believe that we can accept a proposal to
stop nuclear experiments as an isolated step, unaccompa-
nied by any assurances that other measures—which
would go to the heart of the problem—would follow. We
are at a stage when testing is required particularly for the
development of important defensive uses of these weapons.
To stop these tests at this time, in the absence of knowl-
edge that we can go on and achieve effective limitations
on nuclear weapons production and other elements of
armed strength, as well as a measure of assurance against
surprise attack, is a sacrifice which we could not in pru-
dence accept. To do so could increase rather than dimin-
ish the threat of aggression and war. I believe that bolder
and more far-reaching measures are required. Specifically,
I believe that any government which declares its desire to
agree not to use nuclear weapons should, if they are sin-
cere, be prepared to agree to bring an end to their pro-

11U.S. Department of State Bulletin, Vol. XXXVIII, No. 967 (January
duction. Agreement to devote all future production of fissionable material to peaceful uses is, as I see it, the most important step that can be taken. Together with this we have proposed that we begin to transfer to peaceful uses, on a fair and equitable basis, fissionable material presently tied up in stocks of nuclear weapons.

It is difficult to measure the difference between President Eisenhower's statement and the Western position at the conclusion of the London session of the disarmament Subcommittee in August of the same year. The President implied in his letter that a test cessation might be a first step in a series of measures, but—as in the Western position in London—he clearly insisted on linking a test ban with an agreement for a cut-off on the production of weapons, and perhaps with an accord on transferring fissionable material from weapons stockpiles. The extent to which he contemplated links with other measures of disarmament was not clear.

Finally, on January 12, 1958, President Eisenhower sent a formal reply to Chairman Bulganin. The only new element in this letter was the President's statement of his unwillingness to attend a summit meeting without proper preparatory work. He mentioned in particular the need for a meeting of Foreign Ministers, and repeated the suggestion that technical groups from East and West should meet together to discuss appropriate control mechanisms.

This reply can be properly understood only in the context of earlier events. President Eisenhower had been greatly encouraged by his first summit meeting with the Soviet leaders in Geneva in 1955. At least partly because of this euphoria, he was bitterly disappointed when the agreements in principle reached at Geneva dissolved into thin air. As a result, he became even more skeptical of Soviet motivation in seeking agreement with the West, and was determined that the 1955 experience should not be repeated.

Other letters were exchanged in February and March, but they were essentially restatements of points made in the original exchange. Perhaps the most important new element concerning the general positions of the two powers on arms control and disarmament measures related to another aspect of military activities. In a

letter of March 3, Chairman Bulganin stated that the questions of limiting the uses of outer space to peaceful purposes and the liquidation of foreign military bases had to be considered together.\textsuperscript{13} This point was also made in a proposal concerning outer space which the Soviet Union submitted on March 15 for consideration by the thirteenth General Assembly the following fall. In submitting this proposal, the Soviet Union stole a march on the United States, for although American spokesmen had said that some international action was necessary with respect to the use of outer space, the United States had not advanced any concrete proposal. Although these matters may seem rather remote from the issue of nuclear testing, they were relevant.

In considering military policy, and in thinking about arms control or disarmament, it is necessary to consider the means of delivering explosives as well as the explosives themselves. The revolution that has taken place in military technology since the outbreak of the Second World War has involved both of these aspects. Not only has the explosive power of weapons been increased vastly, but new carriers have also been invented which have greatly shortened the time that it takes for a weapon to reach its target. The developments with respect to carriers have had almost as frightening implications as those concerning explosives, for they have narrowed reaction times to dangerously short periods. The maximum warning time for a country under attack by intercontinental ballistic missiles would be about fifteen minutes. In such circumstances there would be little time for rational consideration. Decision-makers would have to respond quickly or risk the possibility of losing a substantial share of their forces. Since controlling the uses of outer space implied controlling the development of missiles as carriers of explosives, this issue concerned the other part of the revolution in military technology, and thus was relevant to attempts to deal with nuclear explosives.

\textit{The Debate About Linking a Test Ban with Other Measures of Arms Control}

In March 1958, then, it was obvious that if there were to be any progress in arms control negotiations, compromises would

have to be made. Some agreement would have to be reached concerning the negotiating forum, and the gap between the two substantive positions would have to be narrowed. So far as the American position was concerned, the question of linking a test ban agreement with an agreement on a production cut-off and other measures of arms control was subjected to intense scrutiny for the purpose of discovering whether some compromise might be possible. Although this debate occurred in many places, it was conducted in public principally before Senator Humphrey’s Subcommittee on Disarmament.

On February 28, the opening day of the Subcommittee’s hearings, Harold Stassen, whose resignation as Special Assistant to the President for Disarmament had only recently been accepted, advocated a test ban as a separate measure.\(^{14}\) He argued that the control requirements for a test ban agreement were not very great and that such an agreement could therefore be negotiated with relative ease. He felt that a test ban agreement, in that it would do something to break the spiral of the arms race and would therefore hopefully have the effect of increasing confidence, might well be an important first step toward achieving other measures of arms control and disarmament. In subsequent sessions of the Subcommittee some of the problems of maintaining a link between a test ban and other measures of disarmament were brought out.

On March 12, for example, in response to questioning, Dr. Spofford English of the Atomic Energy Commission stated that to police a cut-off on the production of nuclear weapons in the Soviet Union three thousand to thirty-five hundred inspectors would have to be stationed on Soviet territory, and he asserted that under a cut-off agreement there could be no secret information with respect to nuclear energy.\(^{15}\) In addition, the point was made several times in the hearings that there was no way of ascertaining with complete certainty the exact size and location of the stockpiles of nuclear weapons then in existence, since such weapons could be hidden


with relative ease. Thus, it would be almost impossible to police an agreement concerning the transfer of fissionable materials from weapons stockpiles if the object of such an agreement were the reduction and ultimate elimination of the stockpiles. One would never know what the starting point was.

On the other hand, the ease with which a test ban alone could be policed was brought out on several occasions. In his testimony, Harold Stassen estimated that eleven or twelve stations in the Soviet Union would be sufficient.\(^{16}\) Later, Professor Harrison Brown, of the California Institute of Technology, estimated that only ten stations would be needed in the USSR, while Professor Jay Orear, of Columbia University, who had just completed a special study for Columbia University's Institute of War and Peace Studies,\(^ {17}\) held that twenty-five would be required.\(^ {18}\)

Whatever number one chose, it seemed clear that the control measures needed to police a test ban would not be very extensive. Thus the impression was given that linking a test ban with a production cut-off and possibly a transfer from stockpiles was irrational, in that it meant joining a measure which did not require very much control with others which required extensive control and concerning which, therefore, agreement was unlikely. Clearly, this was the impression that Senator Humphrey at least had sought to create.

In the hearings the various witnesses connected with the Atomic Energy Commission—the Chairman, Admiral Lewis L. Strauss; Commissioner W. F. Libby; Brigadier General Alfred D. Starbird; and Dr. Spofford G. English—all strongly defended the link. They argued that it was the production of nuclear weapons, not their testing that was dangerous for world peace. In addition, they held that the knowledge which would be derived from further testing would be of greater benefit to the defensive side in a future conflict and thus in their view would be more useful to the United States than to the Soviet Union. For some unexplained reason, they never made the obvious point that if a test ban were achieved without a production cut-off, the Soviet Union could continue to

\(^ {16}\)Ibid., pp. 1351-52.
\(^ {18}\)Hearings: Control and Reduction of Armaments, supra note 14, p. 1495.
enlarge its stockpile with the possibility that eventually it might equal or surpass that of the United States, thus wiping out this element of American superiority. Interestingly, no one from the Departments of State or Defense testified before the Subcommittee during these hearings. Therefore, the representatives of the Atomic Energy Commission were the only Administration witnesses. One could infer from the absence of the State Department spokesmen that Mr. Dulles was not very strongly interested in the issue at this time.

The Soviet Cessation of Testing

On balance, those who favored eliminating the link probably made the better case in public, but this was only one contributing factor in the evolution of American policy. A more important element—which, however, played on the same public sentiments—was a step taken by the USSR. On March 22, the Soviet Union concluded an extensive test series which it had begun the previous fall. This series had been conducted at an unprecedented rate, with two or more nuclear explosions sometimes being detonated in a single day. Professor Hans A. Bethe, a physicist from Cornell University, who for some time had headed the Atomic Energy Commission's scientific panel which reviewed the effects of Soviet nuclear weapons tests, alleged that the pace was determined so that the series would be completed before the United States began its planned 1958 tests.\(^{19}\) As a consequence of the Soviet test series, radioactivity levels rose sharply in the spring of 1958. While the Soviet test series was in progress, it was largely kept secret within the USSR. After it was finished, however, on March 31, the Supreme Soviet adopted a decree resolving "to discontinue the testing of all types of atomic and hydrogen weapons in the Soviet Union."\(^{20}\) The decree also contained an appeal to the other nuclear powers to follow a similar course and the warning that if they did not, the Soviet Union would feel free to resume its own testing program. Chairman Khrushchev restated the appeal on April 4 in a personal letter to President Eisenhower.

\(^{19}\)Ibid., p. 1545.  
The USSR's action won worldwide public acclaim and put the United States in a difficult position, especially since it was just about to begin an extensive test series. President Eisenhower's dismissal of the Soviet move, in his press conference of April 2, as a "gim-mick" that should not be "taken seriously," only served to compound the situation. A day earlier Secretary of State Dulles had admitted that the USSR had at least scored a "certain propaganda victory."

It was probably extremely difficult for Mr. Dulles to make this admission. No Secretary of State enjoys admitting a propaganda defeat, and in this case the unpleasantness was compounded by the fact that Mr. Dulles had seen the problem coming, and had sought to avoid it. Only a few days previously he had argued within the Administration that the United States should itself unilaterally stop testing, presumably because he had been forewarned that the Soviet Union might take this initiative. He argued his case principally in terms of the standing of the United States in world public opinion. His position was buttressed by his foreknowledge that a special panel of the President's Science Advisory Committee, which had been appointed in January 1958 and which was headed by Hans Bethe, would report its more or less unanimous view that a test ban could be policed and that to stop testing at some point in the near future would be in the best interests of the United States.

The Bethe Panel

The appointment of the so-called Bethe Panel was the result of a discussion of the question of nuclear testing at a National Security Council (NSC) meeting in early January. During the discussion Secretary of State Dulles made the point that the United States was suffering propaganda losses because of its nuclear testing programs and expressed his fear that the United Nations General Assembly might soon adopt a resolution condemning further testing, which he felt would prove extremely embarrassing to

the United States. The President apparently shared his concerns. At this juncture, James R. Killian, Jr., the recently appointed Special Assistant for Science and Technology, whom the President had invited to attend the NSC meeting, offered to have the President’s Science Advisory Committee conduct a study of the issues involved in banning nuclear weapon tests. In the late fall of 1957, at one of its first meetings in its new incarnation, PSAC had already begun a tentative exploration of some of the issues.

A few days after the NSC meeting Mr. Killian was directed to appoint the Panel.24 In addition to Professor Bethe, the Panel contained one other member of PSAC, Dr. Herbert York, then Director of the University of California Radiation Laboratory at Livermore. The other members of the Panel were military officers or civilian employees of the government. All members of the Panel were actively involved in either the nuclear weapons development or test detection programs. Although seismologists were available to the Panel, no seismologist was a member, nor did the membership of PSAC include a seismologist. Ronald Spiers, a junior officer in Department of State, attended the sessions as an observer, but this was the only connection which the Department of State had. The Panel was asked to explore two questions: (1) what would be the effect of a nuclear test ban on American and Soviet weapons development programs; and (2) to what extent would it be possible to detect evasions of a nuclear test ban.

In Professor Bethe’s view, at the outset, the majority of the Panel was highly skeptical of the advantages to be gained from a nuclear test ban. Eventually, however, the members of the Panel became persuaded that continued testing would ultimately result in the Soviet Union’s narrowing the United States’ lead in the development of more sophisticated nuclear weapons.25 Professor Bethe probably held this view from the outset. In addition, unlike several

24The members of the Bethe Panel were Dr. Hans Bethe, Chairman; Dr. Harold Brown; Major General Richard Coiner, USAF; General Herbert Loper; Dr. Carson Mark; Mr. Doyle Northrup; Dr. Herbert Scoville, Jr.; Dr. Roderick Spence; Brig. General Alfred Starbird; Col. Lester Woodward, USAF; and Dr. Herbert York.

25The findings of the Bethe Panel have never been made public. It seems reasonable to assume, however, that they are reflected in Professor Bethe’s testimony before the Humphrey Subcommittee on April 17; see
other members of the Panel, he felt that the additional benefits to be gained from further testing were minimal. To put his views in proper perspective, it should be recalled that in 1950, at the time of President Truman's controversial decision to proceed with the development of the hydrogen bomb, Professor Bethe, along with several other scientists, had signed a statement recommending that the United States government pledge never to use hydrogen weapons first, and that he had strongly recommended that the government make every effort to reach an agreement with the USSR concerning the control of nuclear weapons.26 This had ranged him in that debate opposite Edward Teller, perhaps the most ardent advocate within the scientific community of the development of the hydrogen bomb.

**Formulating the Initial American Response**

Within the counsels of the Administration, apparently Chairman Strauss and Donald Quarles countered Mr. Dulles' position by arguing that important military advantages would be gained from the forthcoming test series, a view shared by members of PSAC, including Professor Bethe. In the end then it was decided not to try to take preemptive action against a possible Soviet initiative in this matter.

However, in the new setting the United States obviously had to make some response to the Soviet move, and to Chairman Khrushchev's letter of April 4. President Eisenhower's first reply, on April 8, was essentially a restatement of the general American position on arms control and disarmament issues, along with a repetition of the January 12 suggestion that technical experts from East and West should meet to discuss specific control measures.27 It neither advanced the negotiations nor detracted from the Soviet Union's propaganda advantage.

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Apparently, Secretary Dulles drafted the letter himself. When the question was raised what would happen if the Soviet Union should accept the proposal for technical discussions, he averred that this was extremely unlikely, but that it was nevertheless a limited risk which he was willing to accept. He apparently felt that if the Soviet Union unexpectedly accepted the proposal, "the United States would have a fresh opportunity to pin the Kremlin down to either accepting an effective inspection system or rejecting it. The American propaganda position would benefit either way."\(^{28}\)

On April 22, Chairman Khrushchev sent another letter to President Eisenhower.\(^ {29}\) The letter covered a range of points, but centered particularly on the issues of a test cessation and measures to guard against a surprise attack. With regard to the former, Khrushchev argued that no international controls would be necessary to detect violations of a test ban, but that in any case the Soviet Union had already agreed in principle to the establishment of such controls. In response to the suggestion for a meeting of technical experts, he asserted that it would be impossible for the experts to contribute to the solution of the problem of disarmament unless agreement had been reached between governments. To study the problem of control would simply delay matters. He also restated the Soviet positions concerning aerial inspection zones and controlling the uses of outer space.

Meanwhile, Professor Bethe had reported the conclusions of his Panel to the President, and the President's Science Advisory Committee had retired to Ramey Air Force Base in Puerto Rico to reconsider the American position concerning a test cessation in the light of the unilateral suspension by the USSR. They returned with the recommendation that the planned test series should be completed, but that after that, the United States could risk a test suspension.

\textit{President Eisenhower Suggests a Conference of Experts}

President Eisenhower's reply, dated April 28, to Chairman Khrushchev's most recent missive, appears to have reflected this advice and also the mounting pressure for a test suspension.\(^ {30}\)

\(^{28}\)Earl H. Voss, \textit{Nuclear Ambush}, p. 177.
Though quite brief, it clearly implied that United States policy was in transition. The President repeated the suggestion for technical studies, but this time in the specific context of an agreement to suspend testing. This significant sentence came immediately after the suggestion for technical studies: "Studies of this kind are the necessary preliminaries to putting political decisions actually into effect." Although this was followed by the caveat that technical studies would of course be without prejudice to the positions of the two sides, it should have been clear that if the USSR agreed to have a meeting of experts, and the experts reached an agreed conclusion on a control system, reservations or no, diplomatic negotiations on a test ban agreement would be inevitable, and that these would be pursued separately from those on broader measures of arms control and disarmament.

This letter was drafted in the Department of State and signed by the President and dispatched without consulting the Department of Defense or the Atomic Energy Commission. Since the suggestion for technical talks had been a part of the American negotiating position since 1957, it was assumed—as it had been in the case of the April 8 letter—that there was no need for additional clearance. The immediate problem facing those who drafted the letter was to minimize the propaganda advantages which the Soviet Union had won, and at the same time, to permit the United States to continue its 1958 test series. The decision to continue this series of weapons tests was the only agreed decision within the Administration on the various issues involved. There were of course previous negotiating positions, but no formal consideration was given to the question of whether or not these were applicable to the current situation. The lack of consultation in the drafting of the President's reply prevented the development of an agreed position within the Administration about what the United States should and would do if the Soviet Union accepted his suggestion. The implications of the proposal were not thought through.

Much to the surprise of most American policy-makers, Chairman Khrushchev in his next letter to the President on May 9, after belittling the need for technical discussions, nevertheless agreed to the proposal.31 Thus the Soviet Union now chose to accept a

31Ibid., pp. 1036-41.
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proposal which it had rejected or ignored ever since the London disarmament discussions and which reflected the Western emphasis on a control system as a prerequisite for any test ban agreement.

American policy-makers could only speculate on the motivation for this step by the Soviet Union. As they viewed it, several factors conceivably could have had some influence. Having just completed the test series which had advanced the Soviet weapons art, Soviet leaders may have decided that a test ban agreement might be worth exploring because it would prevent further American testing and development of American weapons and because it might provide relief for the Soviet economy by slowing down the arms race and perhaps leading to further disarmament measures which in turn might reduce the chance of a nuclear war. The prospect of continuing American superiority in nuclear weapons perhaps was less objectionable in the light of Soviet advances in other weapons areas, especially missiles. Moreover, the Soviet military apparently displayed little interest in developing tactical nuclear weapons for which continued testing would be required. Again, a generally accepted test ban agreement might help to resolve the "nth country" problem: both Germany and China might be less likely to obtain a nuclear arsenal. In addition, a recognized US-USSR-UK monopoly in nuclear weapons might point toward broader settlements among the three powers and a directorate-type sharing of power which has always seemed to appeal to the Soviet Union. The international pressures for a test ban mentioned earlier may have had some limited impact on the Soviet government, and the acceptance of President Eisenhower's proposal would obviously strengthen the image of the Soviet Union as being both reasonable and anxious to avoid further fallout pollution. To the extent that President Eisenhower's proposal may have indicated Western willingness to take the test ban out of the disarmament package as a concession to the Soviet view, and considering the character of the proposed forum, it may have appeared worthwhile to test the West's price in terms of a control system, or perhaps to try for an unpolicied ban. It was also possible to believe, however, that the Soviet leaders merely hoped to maneuver the West into a temporary test suspension, which could be used to cut the Western lead in the development of nuclear weapons.

A further exchange of letters between the two heads of states
ensued, and ultimately it was agreed that the Conference of Experts should open on July 1 in Geneva and that the Conference should consist of two panels of experts, one composed of specialists from the United States, the United Kingdom, France, and Canada, and the other, of specialists from the Soviet Union, Czechoslovakia, Poland, and Rumania. There was no consensus as to whether or not agreement at the Conference would automatically commit governments to a test cessation; the USSR insisted that it would, but the United States insisted that it would not.

Through the exchange of correspondence a new negotiating forum was created. Significantly, East and West received equal representation: the concept of parity for which the Soviet Union had striven unsuccessfully in the United Nations and which the Western powers had rejected in the twelfth Assembly only a few months before, was now established. The Soviet Union apparently viewed parity in representation as essential not only as an assurance against being “outvoted” but also as a recognition of what it claimed to be the new power relationship requiring equality in negotiations between East and West.

Moreover, unlike the previous bodies for disarmament negotiations, the new forum was outside of the framework of the United Nations, a development which caused Secretary General Hammarskjöld great concern. As recently as April 2, the Secretary General had argued that controlled disarmament would only be possible through the instrumentality of the United Nations, and as soon as the Conference of Experts appeared likely, he offered the United Nations’ facilities and services. His offer was accepted and the Conference of Experts as well as the subsequent diplomatic negotiations were held at the European headquarters of the UN and were serviced by the UN Secretariat personnel. A personal representative of the Secretary General attended all of the formal meetings. Although the Secretary General’s representative at times played an important role as an intermediary, there is no evidence that either he or the Secretary General influenced the basic course of the negotiations.

The establishment of the new negotiating forum outside the United Nations was a logical consequence of the Soviet Union’s

refusal to negotiate in the UN Disarmament Commission as enlarged by the twelfth Assembly, and perhaps also of the endorsement by the same Assembly of the general Western position on disarmament. It is also true, however, that moving outside the United Nations' framework had certain attractions for the West. Even in 1958 some in the West were beginning to be apprehensive about the implications of the UN's expanded membership. Also, serious negotiations usually require some privacy, which presumably it would be more difficult to ensure in the UN. Finally, the problem of nuclear testing primarily concerned the three nuclear powers. Although it may have been argued that the prestige of the United Nations was adversely affected, it is difficult to identify any tangible repercussions of the fact that the new forum was not created by the UN or specifically approved by it. The General Assembly continued to concern itself with the disarmament problem in its subsequent sessions, and to attempt to affect the course of the negotiations.

One unique characteristic of the new negotiating forum deserves mention. International meetings of scientists arranged by scientific societies and institutions are, of course, a common occurrence. Another pattern is suggested by the 1955 and 1958 international conferences on the peaceful uses of nuclear energy, organized by the United Nations in Geneva, at which scientists as members of governmental delegations exchanged and disseminated technical information. Again, scientists have frequently served as advisers to governmental delegations in the United Nations and other bodies and at times have acted themselves as governmental delegates to technical international bodies and conferences. The 1958 Conference of Experts, however, represented the first instance in which a group of scientists, under the rubric of a technical investigation, was given an independent, specific negotiating task which proved, as will be seen, of paramount importance as a link in a chain of vital diplomatic negotiations.

Perhaps the implications of the new forum were not fully apparent to all persons concerned in the spring of 1958. But as a result of the modifications in the governmental positions mentioned earlier, the stage was set for the first phase of test ban negotiations.
III
Preparations for the Conference

The Western Panel of Experts

After the preliminary arrangements were settled, or at least underway, it was necessary for the four Western governments to agree on the composition of the Western delegations. The Western panel of experts was announced on June 20. It included three Americans: Dr. James B. Fisk, then Vice-President of Bell Telephone Laboratories and a member of the President's Science Advisory Committee; Dr. Robert F. Bacher, a professor of physics at the California Institute of Technology and a member of the President's Science Advisory Committee; and Dr. Ernest O. Lawrence, the Director of the University of California Radiation Laboratory. The other members of the panel were: Sir John Cockroft, a Fellow of the Royal Society; Sir William Penney, also a Fellow of the Royal Society; Professor Yves Rocard, the Director of the Laboratory of Physics, Ecole normale supérieure de Paris; and Dr. Ormond Solandt, former chairman of the Defense Research Board of Canada.

Dr. Fisk was appointed Chairman of the delegation. He was a prominent physicist, who, like many other American senior scientists, had had extensive administrative responsibilities for some time. Except for two brief teaching assignments, and a period in 1947 and 1948 when he served as Director of Research for the Atomic Energy Commission, he had spent most of his active career with the Bell Telephone Laboratories, where he had been a Vice-President since 1954. He had been a member of the Science Advisory Committee since its formation.

A number of advisers were also assigned to the Western delegation. Among the Americans in this group were: university scientists including Professor Hans Bethe, who had headed the special PSAC panel, a number of scientists from government agencies and from the two laboratories which were involved in weapons development (the University of California Radiation Laboratory in Livermore and the Los Alamos Scientific Laboratory), and several of the scientists responsible for the operation of the United States nuclear test detection system, which had been in existence since 1947. The Atomic Energy Commission was kept informed of developments through Captain John H. Morse, Jr., who was a
Special Assistant to AEC's Chairman, Admiral Lewis L. Strauss. In addition, there were three officers from the Department of State: Donald Morris, a 28-year-old foreign affairs officer, who had joined the Department in June 1957; Ronald I. Spiers, the Officer in Charge of Disarmament Affairs, a Foreign Service Reserve Officer Class 4, who was 33, and who had joined the Department in 1955, after having spent five years with the Atomic Energy Commission; and Thomas B. Larson, 43, Chief of the Division of Research for the USSR and Eastern Europe, who as a Foreign Service Officer Class 3, held the highest rank. The fact that a person of as junior a rank as Class 4 was Officer in Charge of Disarmament Affairs reflects the scant attention given to such matters in the Department of State at that time.

In the selection of American scientists for service on the delegation an attempt was made to maintain some balance between the differing views in the scientific community on the wisdom of a test ban agreement. However, this was largely a balance within the center, for the scientists who took extreme positions on either side were not represented. AEC Chairman Lewis Strauss had recommended that Edward Teller be made a member of the Western delegation, but there was so much resistance to Dr. Teller that Strauss withdrew the suggestion, and instead recommended Dr. Lawrence.\textsuperscript{34} James Killian recommended the other two American members of the Western delegation to President Eisenhower. Although Dr. Bacher was somewhat favorably disposed toward a nuclear test ban, he was certainly not as ardent an advocate as

\textsuperscript{33}In addition to Professor Bethe, the other scientists were Harold Brown, Associate Director, Livermore Laboratory; Perry Byerly, Director, Seismographic Stations, University of California; Norman Haskel, Geophysics Research Directorate, Air Force, Cambridge Research Center; Spurgeon M. Keeny, Jr., Office of the Special Assistant to the President for Science and Technology; J. Carson Mark, Director, Theoretical Division, Los Alamos Scientific Laboratory; Doyle Northrup, Technical Director, Office of Atomic Energy, Department of Defense; George B. Olmstead, Assistant Technical Director, Office of Atomic Energy, Department of Defense; Carl F. Romney, Assistant Technical Director, Office of Atomic Energy, Department of Defense; Herbert Scoville, Jr., Consultant, President's Science Advisory Committee; and Anthony L. Turkevich, Enrico Fermi Institute for Nuclear Studies, University of Chicago.

\textsuperscript{34}Earl H. Voss, \textit{Nuclear Ambush}, p. 182.
Hans Bethe, much less Linus Pauling. Dr. Fisk, the Chairman, was regarded as being “neutral” on the issue.

This neatly contrived balance may have been upset somewhat by the fact that Dr. Lawrence became seriously ill during the course of the Conference. On the other hand, the other Livermore scientists on the delegation maintained frequent cable and telephonic contact with Edward Teller in California.

The effort to obtain a balanced representation may be taken in the first place as an indication of an awareness on the part of the American policy-makers that for a variety of factors, which will be discussed later, the technical investigation of the Conference would in fact require exercise of judgment which would or could be affected by the personal views of the scientists. In a delegation acting under governmental instructions the effect of personal views can be minimized if not eliminated. Not so in this “technical” delegation which was to function with minimal instructions, and which nevertheless was to grapple with problems that could not be resolved by resorting exclusively to scientific facts and knowledge. That the Administration felt it necessary to seek balanced membership testified also to the deep division within the American scientific community regarding the wisdom of attempting to seek a test ban. Thirdly, the Administration may well have had in mind the need of ensuring widest possible support in the Congress and by the public generally for whatever conclusions would be reached by the Conference.

Unlike the American members, the two British scientists, members of the Western delegation, as well as the British scientific advisors, all held official government positions. They were connected with the Atomic Energy Authority, the United Kingdom counterpart of the US Atomic Energy Commission, and their selection does not appear to have been affected by their personal views on the desirability of a test ban.

The Eastern Panel of Experts

The Eastern panel of experts should be listed for purposes of comparison. It included Yevgeni K. Fedorov, a corresponding member of the Academy of Sciences of the USSR; N. N. Semenov, an academician; I. Ye. Tamm, an academician; M. A. Sadovsky, a corresponding member of the Academy of Sciences of the USSR;
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O. I. Leypunsky, a professor and doctor of physical-mathematical sciences; I. P. Pasechnik, a scientific collaborator of the Academy of Sciences of the USSR; K. Ye. Gubkin, a scientific collaborator of the Academy of Sciences of the USSR; and Semen K. Tsarapkin, chief of the section of international organizations, and member of the Collegium of the Soviet Ministry of Foreign Affairs. In addition, scientists from Czechoslovakia, Poland, and Rumania were also included.

Dr. Fedorov, who served as Chairman and thus was Dr. Fisk's counterpart, was a geophysicist and had been a member of the Communist party since 1938. Since 1955 he had been Director of the Institute for Applied Geophysics of the Academy of Sciences of the USSR. He had been deeply involved in the Soviet sputnik program and had been a prominent Soviet representative in the International Geophysical Year. In 1958 he published a book entitled Rockets and Artificial Earth Satellites in Investigation of the Upper Atmosphere and the following year another entitled Weather Control. Interestingly, his earlier publications included The Red Army: An Army of the People (1944) and a novel, Concerning the Russian Revolution, 1917–1921 (1939).

His scientific colleagues on the panel were an impressive group. Dr. Semenov was the USSR's first Nobel prize winner. Tamm, the only Soviet delegate who was not a member of the Communist party, was a distinguished physicist; however, his actual role in the Conference was relatively slight. Dr. Sadovsky was a seismologist who apparently had been concerned for some time with the Soviet Union's nuclear test detection system.

The inclusion of Mr. Tsarapkin, one of the USSR's leading diplomats, marked the most important difference from the composition of the American delegation, which had no diplomats among its members and included even among its advisors only junior diplomats. Fifty-two years of age, Tsarapkin had been a member of Soviet delegations to the United Nations since 1947, eventually becoming Secretary General of the delegation. During the Second World War, he had been Minister Counselor of the Soviet Embassy in Washington and he had represented the USSR at the Dumbarton Oaks and San Francisco Conferences. After the Conference of Experts he became the USSR's chief delegate in the test ban negotiations. He did not speak during the formal sessions of the
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Conference of Experts, but it was obvious to the participants that he played a crucial role in determining the Eastern position. High ranking Polish and Czechoslovakian diplomats were also included in the Eastern panel.

The Technical Preparation of the American Delegation

Since the time between its appointment and the opening of the Conference of Experts was little more than five weeks, the American delegation had to rely for technical preparation principally on their personal knowledge and experience, the work and conclusions of the Bethe Panel, and previous studies conducted by such groups as the task forces which Harold Stassen had assembled during his tenure of office. It is not clear, however, to what extent this earlier work was actually available and how much it was taken into account. Because the problem of detecting nuclear weapons tests involved a number of disciplines, several Western delegates had to spend part of their time prior to the conference merely in attempting to learn enough about disciplines other than their own so that they could understand their colleagues.

Although the report of the Bethe Panel has never been made public, it is possible to make certain inferences concerning its nature. In general, it can be said the Panel concluded that large nuclear explosions on the surface of the earth and in the atmosphere and substratosphere could be detected fairly easily by the United States’ own detection system, but that an international network of control stations and the use of airborne sampling techniques for the collection of radioactive debris would be necessary for the conclusive identification of such explosions and for the detection of low-yield tests.

There were two possible environments for testing nuclear weapons in which the United States had little or no experience—deep underground and at extremely high altitudes (above 30 to 50 kilometers, or above approximately 19 to 31 miles). The United States had detonated only one nuclear explosion deep underground, the Rainier 1.7 kiloton shot, fired in Nevada on September 10, 1957. This shot had been designed as an experiment to explore whether certain kinds of weapons could be tested without creating radioactive fallout. It had been set up on a short time schedule, and was not highly instrumented. Thus, knowledge about the ex-
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plosion and its effects was limited. Although the purpose of the shot was not to measure detectability, because of the general interest in detectability the test had been announced in advance, and a number of seismological stations—seismic signals are the only known means for the detection of deep underground explosions when no radioactive debris escapes the earth's surface—had voluntarily, and without financial support from the government, attempted to detect it. The shot was detected by a number of seismological stations within a radius of approximately 650 miles and by two stations beyond that distance, the most distant of which was at College Station, Fairbanks, Alaska, approximately 2,350 miles from the test site. However, it was somewhat debatable whether the signal which was received at that station would actually have been noticed there and distinguished from those created by minor earthquakes, had not the test been announced in advance.35

The direction of the first motion of the signal produced by a disturbance was probably the most important piece of diagnostic information—at least it was the one that most American seismologists felt should be used—in distinguishing between nuclear explosions and minor earthquakes. In the case of an explosion the first motions in all directions from the event are compressions, which will be registered as outward movements, while in the case of an earthquake there are usually some rarefactions, which will be registered as inward movements.

It is worth viewing the recording of the Rainier shot at College Station (Fig. 1), to see how difficult is the problem of distinguishing explosions from earthquakes.

In any case, regardless of one's willingness to agree that explosions could be detected at great distances, it was clear that the Rainier shot had been detected at near stations and the tendency, at least in nonclassified studies, was to generalize and extrapolate from this single experiment.36 Presumably, the Bethe Panel also followed this tendency.

On the basis of the Rainier experiment, the general under-

35See the testimony of Admiral Lewis Strauss: Hearings: Control and Reduction of Armaments, supra note 14, pp. 1584-87.
standing was that even relatively small underground nuclear explosions could be detected, the exact magnitude depending upon the distance between control stations. The willingness of scientists to generalize on the basis of this one experiment varied greatly, depending on the individual's temperament, his basic predispositions, his office, and several other factors. Presumably, one factor was the way in which and persistence with which questions were asked. While a scientist in a laboratory might say that it was impossible to draw any general conclusion at this stage, the same individual might make some response when subjected to repeated questioning by government officials.

The range of answers that was possible was brought out clearly in June 1958 when the Senate Subcommittee on Disarmament published the replies of thirty-five seismologists, geophysicists, and geologists to a questionnaire on the detection of and inspection for underground nuclear explosions. The report contained a mass of contradictory information. Some of the scientists replied unambiguously that underground explosions could be detected, others thought that some such explosions could, while still others held that it was impossible to make any general statement on the basis of

37 U.S. Congress, Senate, Committee on Foreign Relations, Subcommittee on Disarmament, Control and Reduction of Armaments: Detection of and Inspection for Underground Explosions: Replies from Seismologists to Subcommittee Questionnaire: Staff Study No. 10 (Comm. Print 1958).
existing knowledge. There was no agreement concerning the size of signals produced by explosions of various yields.

There was general agreement that on-site inspections would be necessary in some cases to determine whether an underground activity shown on a seismograph was an earthquake or a nuclear explosion, and in all cases to establish positive evidence that a nuclear explosion had taken place, since the only conclusive identification would be the discovery of radioactive debris. However, relatively little was known about the procedures which would be required in the case of an on-site inspection. Again, the Rainier shot was the only available experimental evidence. In that instance, even with foreknowledge of the location of the detonation, it had taken investigators more than two months to discover any radioactive materials evidencing the explosion.\textsuperscript{38} Admittedly, this had been the first attempt of this nature, and the investigators had proceeded with great caution, but their experience was sufficient to indicate that the task would be difficult.

Prior to 1958, the United States had not detonated any nuclear weapons at high altitudes. (The Soviet Union may have.) Perhaps as a consequence, the Bethe Panel did not deal with testing in this environment.

There was still another area in which American technical preparation was relatively weak. Little thought had been given to ways in which nuclear explosions might be camouflaged and hidden.\textsuperscript{39} There was not much experimental evidence, even with regard to fairly unsophisticated techniques such as shielding. Thus the Bethe Panel could not have done much more on this subject than to make certain hastily contrived assumptions and theoretical calculations.

\textit{The Problem of the Threshold}

It was obvious to those who had studied the problem of detecting nuclear explosions that in the prevailing state of knowledge no feasible system would be capable of detecting and identifying all explosions in all environments. There would always be, de-

\textsuperscript{38}See \textit{Hearings: Control and Reduction of Armaments}, supra note 14, pp. 1366-68.

\textsuperscript{39}See \textit{ibid.}, p. 1486. Jay Orear made a few estimates, but they were extremely unsophisticated. See \textit{ibid.}, pp. 1501-2; and Seymour Melman (ed.) \textit{Inspection for Disarmament}, p. 96.
pending on the number of control stations and their equipment and the rights of inspection, various thresholds beyond which under certain circumstances evasion might be possible. Apparently, the Bethe Panel made this point. However, neither that group nor the Administration generally reached a conclusion concerning what threshold would be compatible with American security interests; that is, concerning what was the maximum yield explosion which could be allowed to remain outside the absolute reach of the control system. Under the circumstances this was essentially a matter of political judgment which called for the highest level decision, taking into account all the relevant military as well as political considerations.

Uncertainty about the threshold in large part accounted for the varying estimates of the number of control posts which would be needed in the USSR. Public estimates ranged from Professor Harrison Brown's statement before the Humphrey Subcommittee that ten would be sufficient, through Mr. Dulles' press conference remark that more than twenty-four would be required,\(^40\) to the high estimate given by Professor Frank Press, a leading seismologist at the California Institute of Technology, who stated that even with one hundred stations in the USSR, some nuclear explosions of 2 kilotons or more might escape detection.\(^41\)

In view of the then current interest in developing low yield tactical nuclear weapons—especially the neutron bomb, the detonation of which would be difficult to detect—and because of the scientific possibility of extrapolating data gained from small explosions, there was general agreement that the threshold would have to be fairly low. Despite the urging of various scientists, however, the Administration did not attempt to reach a decision on a specific figure; instead this issue was dropped into the lap of the American delegation in Geneva.

Policy-Makers' Awareness of the State of Knowledge Concerning the Detection of Nuclear Explosions

It is important to ask how well United States policy-makers, whose decisions were responsible for the convening of the Con-


\(^41\)New York Times, May 1, 1958, p. 5.
ference of Experts, understood the state of knowledge with respect to the detection of nuclear explosions. It seems clear that they understood these matters in broad outline. Professor Bethe presented his conclusions to the National Security Council in early April,42 and later that month testified before the Subcommittee on Disarmament. Of the forty-five minutes which the National Security Council spent discussing the issue, about forty were devoted to a discussion of the effects of a nuclear test ban on the relative military strength of the United States and the Soviet Union, and about five to a discussion of the problems of detection, although the fifteen-page report was equally divided between the two questions. Professor Bethe spent two hours and five minutes before the Subcommittee on Disarmament. Most of that time was spent on the issue of detection. In addition, the Subcommittee received testimony from several other scientists on this issue on other occasions.

Secretary of State Dulles' remarks in his news conferences indicate that in his case at least the scientists had made the point that no control system would give an absolute guarantee against evasion.43 Indeed, it is widely reputed that members of the President's Science Advisory Committee were responsible for the acceptance by the Administration of the proposition that a less than absolute guarantee would provide adequate deterrence against evasion,44 although this idea certainly must have fitted Mr. Dulles' predispositions, as the broad concept of deterrence played an extremely important role in his own thinking. The political leaders must also have understood that very little was known about testing nuclear weapons deep underground and at high altitudes. In view of subsequent events, however, it is less clear that they understood the scientific implications of this lack of knowledge; that it was difficult if not impossible to predict what future discoveries would yield. Perhaps no one who did not have an extensive background in science could understand this, and, indeed, even some scientists

occasionally tend to state their tentative conclusions as final answers. For the nonscientist, one confusing issue is that even the most tentative conclusions can be stated in what appear to be quantitatively precise terms. Since the space age was only a few months old, the whole concept of testing nuclear weapons at high altitudes may well have seemed more like science fiction than reality. Nor is it clear that American policy-makers were fully aware of the inability on the part of the scientists to say with any degree of accuracy what would happen if clever scientific minds were applied to the task of devising means of conducting clandestine tests of nuclear weapons. Whether the scientists did their best to emphasize these uncertainties and whether they were influenced in their presentation of the sketchy scientific facts by their own ideas regarding the wisdom of a test ban is also less than clear.

The Instructions Given to the American Delegation

The instructions which were given to the American members and advisors of the Western delegation to the Conference of Experts appear to have been minimal. In a press conference on June 10, Secretary of State Dulles described his instructions to the American experts in this manner:

Our guidance to the United States experts, at least—I talked to them a few days ago and told them to look upon their job as a purely scientific technical job. They are to come to their own conclusions as to what is necessary to detect an explosion. Perhaps, in the light of the Soviet proposal, they may have to report on the evaluation of a lesser than complete detection system—bearing on the likelihood that there would be an evasion attempted. For example, it may be that they would say this system isn’t 100 percent perfect but it is good enough that we would think that there would be a 75 percent chance that any evasion would be caught. They may have to make calculations of that sort. But we have given them complete authority to work on this matter as a purely scientific technical matter, to use their best judgment and report to us accordingly. I do not anticipate that there will be any need for political guidance.45

Mr. Dulles was more painstaking in his private conversations than these remarks indicate. Terms of reference were drafted prior to the American experts' departure and a position paper was prepared by the Department of State and cleared with other interested departments. Nevertheless, in broad outline, Mr. Dulles' press conference remarks were a fairly accurate summary of the instructions. The American experts were given a great deal of freedom. They were merely told to seek some common understanding concerning the various techniques of detecting nuclear weapons tests, to analyze the capabilities and limitations of each technique, and to outline possible systems for policing a test cessation agreement. They were not told what role and status any report resulting from the Conference of Experts would have. As an entity the Administration obviously had no clear conception or expectations in this matter.

The general attitude reflected in these instructions or lack thereof partially explains why the advisers from the Department of State who were attached to the Western delegation had such relatively junior rank, in contrast to the Soviet delegation which included a senior diplomat as a full member. The assumption apparently was that the Conference of Experts would be purely a technical conference, and the Department of State adhered to this assumption throughout the Conference, for although the American delegation reported daily, it was never given fixed instructions nor told what position to take. A large number of the scientists in the American delegation also regarded their task as a purely technical one. Public opinion, however, certainly did not treat the Conference in this fashion. On the contrary, it was widely heralded in the public debate as an event of great political significance, as the prelude to a test ban agreement. That the public concept of the political nature and significance of the Conference was not far from reality was to be brought out by subsequent events.

One of the few political instructions which the American experts were given was that any control system must ultimately include mainland China. The reason for this was that it was thought

46 In the same press conference, Mr. Dulles made the following statement: "I would suppose that we would want to have—that the experts would feel we needed to have—inspection posts with some mobility not only in the Soviet Union but also on the mainland of China and other areas of that sort." Ibid., p. 1085.
that control posts on mainland China would be necessary for the detection of certain explosions inside some border areas of the USSR. Moreover, without control posts in China, in view of the Sino-Soviet alliance, the Soviet Union might conduct clandestine explosions there. It was known that the Soviet Union had conducted certain underground tests in China, though these were assumed to be chemical explosions.\footnote{See \textit{Hearings: Control and Reduction of Armaments, supra} note 14, p. 1546.} Because of the United States’ position with respect to the recognition of the People’s Republic of China, however, the experts were not permitted to refer to China, but instead had to insist on drafting a scheme for a “worldwide” system. As Mr. Dulles put it in a press conference: “... after the experts decide where it is necessary to have these posts, then there will have to be a political problem dealt with.”\footnote{U.S. Department of State \textit{Bulletin}, Vol. XXXVIII, No. 992 (June 30, 1958), p. 1085.} Apparently as of June 1958, he was not prepared to tackle this problem in the abstract. Considering the known views concerning Communist China of the Assistant Secretary of State for Far Eastern Affairs, Walter S. Robertson, and other influential political leaders, the problem would indeed be formidable.

Beyond this, the experts were, as Mr. Dulles said, “to come to their own conclusions.” Thus the experts were asked to “decide where it is necessary to have these posts,” to determine in general terms the number and location of the control posts without, however, being told what risks the United States was prepared to accept in view of the fact that a foolproof control system was not technically feasible. As the Conference unfolded—it will be seen shortly—other judgments with important political implications had to be made and Mr. Dulles’ statement of instructions proved increasingly inadequate.

\textit{The United Kingdom Component}

In addition to the Americans, the British were the only members of the Western panel to play an important role in the Conference of Experts. Like the Americans, the British scientists were given minimal political instructions. They were, however, urged to do all that they could to facilitate an agreement. They did not bring
The Conference of Experts ran its course, on the whole, uninfluenced by external events. It was not that the world beyond the shores of Lake Geneva was static. On the contrary, East-West tension rose sharply during the period of the Conference. The principal cause was the crisis in the Middle East, which led eventually to military intervention by the United States and the United Kingdom. In the spiraling tension, the projected summit conference was at least postponed. The only encouraging development during the Conference of Experts was that on July 2, Chairman Khrushchev, in another letter to President Eisenhower, in a sense responding to the President's earlier general proposal, suggested that there should be a meeting at the expert level to consider practical aspects of the problem of developing guarantees against surprise attacks, and the United States agreed to this suggestion on July 31.49 It later transpired, however, that the two governments were hopelessly at odds as to the nature of this meeting.

One other external event should also be mentioned. On July 2, the day after the Conference of Experts opened, Premier Charles de Gaulle stated in a letter to Chairman Khrushchev that France would not agree to a test ban unless it were accompanied by other measures of disarmament.50 This communication made it clear that the French government, obviously determined to preserve its freedom to develop its own weapons program, was opposed to any loosening of the Western disarmament package.

The Agenda

As had become the fashion in East-West meetings, the Conference of Experts opened with an argument about the agenda. The argument stemmed from the Soviet desire to obtain a prior commitment that the ultimate objective of the Conference was a test ban,\textsuperscript{51} and the contrary Western desire to limit the Conference to a technical analysis of the methods of monitoring a test ban.\textsuperscript{52} The USSR had known what the Western position would be even before the opening of the Conference, among other reasons, because the United States Embassy in Moscow had delivered to the Soviet Foreign Ministry a list of the technical factors and special questions which the United States felt should be covered in the talks. Obviously, though, the submission of the list did not settle the issue, and at the very outset of the Conference the experts were faced with an essentially political issue. In this debate, Dr. Fedorov argued that national detection systems would actually be adequate to monitor a test ban, while Dr. Fisk, on the other hand, maintained that an international system would be required. Some East-West meetings, it will be recalled, have deadlocked on the agenda issue with political implications and have never reached the substantive problems. Unlike these confrontations, however, this controversy about the agenda was resolved fairly easily, and the solution was largely based on the Western position. After a brief recess, an agenda was adopted, and technical discussions began at the third meeting on July 4, 1958.

The Analysis of the Techniques of Detection

After a general exchange of views concerning the various methods of detecting nuclear explosions, the Experts examined in detail each of the four basic methods—recording acoustic and hydroacoustic waves, recording radio signals, collecting radioactive debris, and recording seismic signals. During this phase, the Conference was a curious cross between a diplomatic negotiation and an international scientific congress, with the latter aspect generally

\textsuperscript{51}See Ye. K. Fedorov's opening statement: Conference of Experts Document EXP/NUC/PV. 1, p. 27. Hereafter all documents of the Conference of Experts and the Geneva Conference will be cited by their symbol only.

\textsuperscript{52}See J. B. Fisk's opening statement, \textit{ibid.}, p. 12.
The objective was to write brief reports outlining the capabilities and limitations of each of the methods. This was mainly a matter of interpreting agreed theories and objective data. Nevertheless, the conclusions would have significance for national positions and policies, and this fact was always apparent.

The Western scientists tended to present more quantitative data, and their interpretations were, in general, more conservative than those of their Eastern counterparts. In a sense, this situation was a logical consequence of the respective political positions of the two sides; since the West was insistent upon the necessity of international control, it also had to bear the burden of proof of the necessity for such control. The Soviet scientists consistently took the position that the progress of science would make the task of detection easier. Although the Western scientists were unwilling to admit such a broad proposition in principle, interestingly, in each of the specific assessments of the four main techniques of detection, they were willing to admit a statement to the same general effect. Thus, the concluding paragraph in each subsection analyzing a particular technique, contained a sentence stating that the capabilities of that particular technique will most likely improve in the future.

One of the most significant features of the exchange between the Western and Eastern scientists concerning these matters was that it was incomplete. Neither side was willing to reveal the effectiveness of its national detection system, nor to divulge information about its weapons tests which might not be known by the other side. Therefore, the Eastern scientists generally presented their calculations in theoretical terms only, and when the Western scientists used concrete data, it was information about Western tests which had already been fairly widely publicized. It is impossible to know whether or not greater openness on both sides would have resulted in more clarity and certainty. Presumably neither side accepted conclusions which its private information contradicted.

There was one exception to this general pattern. Fairly late in the Conference, in an attempt to buttress an argument, Dr. Fedorov stated that during the current American test series in the Pacific,

53For detailed analyses of this aspect of the Conference see Ciro E. Zoppo, Technical and Political Aspects of Arms Control Negotiations: The 1958 Experts Conference (RAND Corp. 1962, Memorandum RM-3286-ARPA), and Earl H. Voss, Nuclear Ambush, pp. 183-203.
although the Atomic Energy Commission had announced only fourteen explosions, the USSR had detected thirty-two and he gave the time of each of the shots. Although the United States task force in charge of the series had in fact planned and attempted to detonate thirty-two explosions, only thirty of these attempts had actually been successful. The Western scientists could only conclude therefore that the USSR had obtained its data through some technique other than those being discussed at the Conference. Conceivably the Soviet data could have been gained through monitoring the American communication network from Soviet ships stationed near the Pacific testing area. It goes without saying that Dr. Fedorov's presentation did little to advance the Soviet position. Moreover, the American scientists were convinced that certain American explosions of small nuclear weapons had not been detected in the Soviet Union.

There was little controversy between East and West regarding two of the methods of detection, recording acoustic and hydro-acoustic waves and recording radio signals. The other two, recording seismic waves and the collection of radioactive debris, however, were the source of some dispute.

The Collection of Radioactive Debris and the Dispute Concerning Overflights

There was a controversy as to whether the collection of radioactive debris from ground stations would be sufficient, or whether sampling techniques involving the use of aircraft would also be needed. This issue was important because radioactive debris is the only incontrovertible evidence that a nuclear explosion has occurred. The Soviet scientists maintained that collection points at ground stations would be sufficient for purposes of detection of nuclear explosions in violation of a test ban agreement, while the Western scientists argued that in addition samples taken from the air were vitally necessary. The problem can be stated this way: if the parties to a test ban were willing to allow aircraft to fly over

54 EXP/NUC/PV. 22, pp. 4-5.
55 See New York Times, August 1, 1958, p. 4.
56 See EXP/NUC/PV. 8, p. 91; EXP/NUC/PV. 10, pp. 4, 26; EXP/NUC/PV. 12, p. 121.
57 See EXP/NUC/PV. 9, pp. 4, 5, 11; EXP/NUC/PV. 10, p. 21; EXP/NUC/PV. 12, pp. 4-6; and EXP/NUC/PV. 14, pp. 41, 48-50.
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their territories on certain occasions, they would gain a more sensitive, more precise and prompter means of detecting and identifying nuclear explosions. Exactly what the margins were, though, was difficult to determine. In reply to Dr. Fedorov's doubting request for information about explosions which were detected by aircraft but not by ground stations,58 two Western scientists—employees of the Department of Defense—cited the cases of two "low kiloton" explosions in Nevada, but added that the really important issue was the speed of detection.59 Everyone agreed that as a consequence of a test ban agreement both methods would become more effective, since the quantity of radioactive debris in the atmosphere would decrease, and the effects of a new explosion would therefore be more obvious.

Clearly this controversy involved an issue of basic political significance: the effectiveness of a system to monitor a test ban agreement on the one hand, and the degree to which signatory states would be required to open their territory on the other. Two years later the U-2 incident would show how sensitive the issue of overflight was. That the dispute had political implications was confirmed by the fact that when it was leaked to the press, presumably by some member of the Western panel, the Soviet delegation complained bitterly.60 Ultimately, a compromise was worked out. It was agreed that sampling techniques involving the use of aircraft would be recommended. However, this agreement in principle was qualified in the following manner:

To this end use should be made chiefly of the aircraft flights over the oceans made for the purpose of meteorological observations.
10. In some cases use can be made of aircraft flights over the territories of the USA, the USSR, the UK and other countries to collect air samples for the purpose of checking on data obtained by the other methods of detection of nuclear explosions.

The Experts consider that to accomplish this task it would be quite sufficient to make use of the aircraft of

58EXP/NUC/PV. 12, p. 121.
59See EXP/NUC/PV. 14, pp. 41, 48-50.
the country being overflown and that in such cases it is sufficient that flights for the purpose specified should be made along routes laid down in advance. Representatives of the USSR, the USA, the UK or other States participating in the operation of the control system may be on board these aircraft in the capacity of observers.\textsuperscript{61}

The Western scientists felt that because of the nature of this issue they had to refer the exact wording of the compromise formulation to Washington for approval, which was granted. This was the only instance in which this procedure was followed.

\textbf{The Problem of Seismic Signals}

Eastern and Western scientists were unable to agree on the effectiveness of the method of recording seismic signals. The reason for the difficulty was not clear. It may have stemmed partly from the fact that different scales for measuring seismic waves were used in Eastern and Western countries, and it was difficult to correlate the data measured by the two scales. In addition, the problem of estimating the seismic signal which would be produced by nuclear explosions of varying yields was a task of considerable intellectual difficulty, particularly in view of the fact that all of the calculations had to be extrapolations from a single point, the Rainier explosion. Whatever the cause, the controversy was extremely important, for the conclusions would determine many of the basic characteristics of the control network. Since underground nuclear explosions could only be detected through seismic waves, and since this was perhaps the least efficient of all the techniques, the figures accepted here would be of critical importance in determining the spacing and location of control posts. Moreover, since a major purpose of this technique was to distinguish earthquakes from nuclear explosions, the assessment of the capability for accomplishing this purpose would vitally affect the number of on-site inspections which would be required. The Soviet scientists were consistently more optimistic than their Western counterparts. The Americans attempted to buttress their position by citing the

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Rainier experiment, but Dr. Fedorov and other Soviet specialists countered by arguing the need to introduce theoretical considerations and data from TNT explosions. In the end, a compromise was reached, and as a consequence, the conclusions concerning this technique were considerably more optimistic than the original American presentation,\(^{62}\) although they were not inconsistent with the Rainier data.

**Detection of Explosions at High Altitudes**

As indicated earlier, the United States had not detonated any nuclear weapons at high altitudes prior to 1958 and thus the Western scientists had no empirical foundation for any position. Both sides recognized this lack of experimental data with respect to the problem of detecting nuclear explosions conducted at high altitudes. The report made it clear that the Experts' conclusions in this area were based on purely theoretical considerations. Moreover, in contrast to the situation with respect to the surface, atmospheric, and underground explosions, the control system recommended by the Experts did not include any specific techniques for the detection and identification of nuclear explosions at high altitudes.

**Camouflaging and Concealing Nuclear Explosions**

During the course of the Conference very little attention was given to the ways in which a state which was determined to violate a test ban agreement might attempt to conceal or disguise nuclear explosions. Hans Bethe presented a paper in which he purported to prove that it would not be possible to "decouple" an underground explosion so that no or significantly weakened seismic waves would be produced.\(^{63}\) Richard Latter, of the RAND Corporation, and Doyle Northrup, of the Department of Defense, discussed the possibility of shielding nuclear explosions so that their effects would be greatly reduced, and Harold Brown, of the University of California Radiation Laboratory, pointed out a number of techniques which might be used to make the identification of some nuclear explosions extremely difficult if not impossible. Soviet delegates tended to denigrate these presentations. Although the


\(^{63}\)See EXP/NUC/PV. 14, pp. 57-85.
points raised by Drs. Latter, Northrup, and Brown found their way into the Experts' report, they were mentioned only in passing and quite incidentally.

In these matters, as in the case of deep underground explosions, the scientists were working without the benefit of much empirical data. Their calculations were largely theoretical. This had the effect of making it difficult if not impossible for either side to prove its points conclusively.

The Elaboration of a System

After an analysis of each of the various techniques for detecting and identifying nuclear explosions had been completed, the next point on the agenda of the Conference of Experts was to examine these techniques in combination, with a view to considering what kind of system could be established for monitoring a test ban agreement. Formulating a system was partly a matter of deduction from the previously agreed conclusions concerning each of the various techniques—of applying the agreed formulae. However, various choices also had to be made. Perhaps the most important concerned the threshold—how sensitive should the system be, what yield explosions should the system be designed to detect and identify, and with what degree of assurance? Deductions as to the character of the system would depend on the answer to this question.

Even after the threshold had been established, there were other choices to be made. An equation containing several variables allows flexibility in fixing its components, and designing a control system involved manipulation of such an equation with a considerable degree of discretion; for example, increasing the number of fixed control posts would tend to reduce the need for on-site inspections. Elaboration of a system depended to some extent upon assumptions about unknown factors, especially the level of background noise throughout the world which would interfere with reception by the various techniques and thus reduce their reliability. Finally, assumptions had to be made about the competence, efficiency, and reliability of the personnel who would operate the system. For example, one could compensate for presumed low level technical competence by more elaborate mechanisms or by mechanical redundancy. In making these choices the American scientists, and
apparently the entire Western delegation, were completely on their own; their instructions provided no guidance.

When the discussion of this agenda item opened, Dr. Fedorov immediately tabled a proposal for a control system involving from 100 to 110 control stations.\(^{64}\) All of the technical bases for this proposal were not immediately made clear; however, several assumptions and calculations underlying it were brought out by both the Soviet and Western scientists in the subsequent debates. Apparently the acoustic method—a relatively efficient method of detecting nuclear explosions in the atmosphere—was used in establishing distances between control posts and thus determining their number. In addition, the Soviet proposal relied considerably on the existing net of seismic stations for distinguishing earthquakes from underground nuclear explosions and purported to use other aspects of seismic signals than first motion for purposes of detection and identification.

Neither approach was acceptable to the West. The Western scientists felt that the seismic method should determine the location of control posts. They held that existing seismic stations could be used to supplement the international control system, but could not serve as its basic components. For one thing, the Western scientists were doubtful about the adequacy of the equipment of existing seismic stations. In addition, since reversing the polarity of a seismograph can be accomplished fairly easily by merely switching some wires and the sign of first motion is thereby obscured and a compression made to appear a rarefaction, they were unwilling to rely on seismic stations which were completely manned by the personnel of a possible violator state. Nor were the Western scientists willing to accept other criteria than first motion, which they felt was the only method that had been proved.

The Soviet scientists never gave a flat estimate of the capabilities of the system which they proposed, what yield explosions it would detect and identify. But given Mr. Tsarapkin’s presence on the Eastern delegation—if nothing else—the threshold on which the proposal was based was presumably politically acceptable to the USSR. At one point the Western scientists estimated that the system by itself would have the following capability of detecting and identifying underground nuclear explosions of various yields: 5

\(^{64}\)EXP/NUC/PV. 22, pp. 3-31.
percent of those which had a yield of 1 kiloton; 50 percent of those which had a yield of 5 kilotons; and 90 percent of those which had a yield of 20 kilotons.\textsuperscript{65}

Obviously, the Western panel could not just simply reject this proposal, but had to introduce a counter proposal. The task of elaborating a system for the West to propose was assigned to two young American scientists: Harold Brown of the University of California Radiation Laboratory and Richard Latter. The former, a child prodigy who had received his Ph. D. in physics while still 21, was at the time 29. His colleague was 35. They used the seismic method—the principal means of detecting underground nuclear explosions and a technique for which the most effective range is somewhat less than that of the acoustic method—as the determinant of distances between control posts. They postulated that the criteria for determining the threshold of the system would be observation of the sign of first motion on seismographs at five stations of the international control system. On the basis of these assumptions, and positing that the system should have a 90 percent capability of detecting and identifying underground explosions with a yield of 1 kiloton, they concluded that approximately 650 control stations would be needed.

Some of the Brown-Latter assumptions and calculations were outlined at the same meeting at which the Soviet proposal was introduced, and they were developed in more detail and the conclusion about the number of control posts needed was presented in subsequent sessions. Although the exact number of control posts which would be required in the Soviet Union was never specified, it was obvious that it would be fairly large. Without formally rejecting the Western presentation—which the Americans insisted was not a proposal—Dr. Fedorov made it obvious that such a control system would be unacceptable to the USSR.

After several sessions, on Tuesday, August 5, Sir William Penney of the United Kingdom, reading an agreed Western position, introduced a third system.\textsuperscript{66} It was based on the same type of analysis as the system which the West had introduced previously; however, the threshold was raised. In this case with approximately

\textsuperscript{65}\textit{EXP/NUC/PV. 26, p. 26.}\textsuperscript{66}\textit{Ibid., pp. 26-35.}
170 land-based control posts and several ships, the system was estimated to have a "good probability" of detecting and identifying nuclear explosions with yields down to one kiloton in the atmosphere and in the open ocean and also a "good probability" of recording seismic signals from deep underground nuclear explosions equivalent to one kiloton. In the latter case, it was assumed that there would be some difficulty in distinguishing the signals generated by explosions from those generated by earthquakes, and that this difficulty would increase significantly as one moved down from five kilotons to one kiloton. It was estimated that the system would be able to "identify as being of natural origin about 90 percent of the continental earthquakes, whose signals are equivalent to 5 kilotons, and a small percentage of continental earthquakes equivalent to 1 kiloton." Since the system had relatively little capability with respect to subkiloton explosions, it was thought that it would probably not have been able to detect experiments involving the development of a neutron bomb.

At the same meeting, Dr. Fisk suggested that the experts might adopt a report which would list all three systems, outlining the capabilities and limitations of each. Dr. Fedorov, however, made it apparent that the Eastern panel would only consider agreeing to a report which listed one system. Obviously a report which listed one system would have many more political implications and much greater political impact than one which listed several, and would be much more of a commitment so far as subsequent negotiations were concerned.

Six days elapsed before the next formal meeting. Dr. Fisk tried desperately to obtain a judgment from Washington as to whether or not the control system presented by Sir William would present an acceptable risk to the United States, but he could not obtain this assurance. Meanwhile, in Geneva there were three informal meetings, at which records were not kept. On Monday, August 11, the two sides promptly agreed to recommend to their governments a control system generally patterned after that which had been outlined by Sir William Penney. It was probably during this period that a number of the Western scientists were made

68EXP/NUC/PV. 26, p. 61.
aware of the political implications of their efforts. Many of them appear not to have realized at the outset that what they did would become the basis for subsequent diplomatic negotiations. Even at this point, all of them may not have fully grasped all of the implications of their situation, but they must at least have been conscious of them to some extent. In any case, from this day on, and for the next three years, the figure of from 170 to 180 land and sea control posts became the fixed basis for negotiations.

There were a number of other matters which had to be settled once agreement had been reached on the broad outlines of a system. Dr. Fedorov sought to include in the Report of the Conference of Experts recommendations on the staffing of the control posts and the phasing of their establishment. He ventured the opinion that one or two controllers from "the other side"—that is, from the Western powers in control posts in the USSR and other communist countries and vice versa—would be sufficient to insure the proper functioning of a control post,69 and that the control posts should be established first on the territories of the United States, the Soviet Union, the United Kingdom, Australia, Africa, and the Pacific Ocean area.70 The Western scientists ruled out discussion of both of these proposals on the ground that they involved "political" rather than technical issues. The Report of the Conference of Experts merely stated that approximately thirty persons would be required to man a control post,71 and it only specified the number of control posts that would be required on each continent and generally on islands and ships on the high seas, without mentioning specific countries.72 The Experts also considered and reached detailed agreement on the specific equipment to be installed at each control post.

On-Site Inspection

The final matter discussed by the Experts was the problem of on-site inspections. Originally, the Western scientists advanced the

69 EXP/NUC/PV. 23, p. 41.
70 EXP/NUC/PV. 22, p. 31.
72 Ibid.
concept that inspections should be initiated by automatic criteria—any suspicious and unexplained signal of a given magnitude—and that there should be an elaborate mechanism for conducting such inspections. For a variety of reasons—principally Soviet objections and lack of time and data—the Western scientists did not follow this initial presentation with detailed proposals. Consequently, the section in the Experts' Report dealing with the problem of on-site inspections is quite brief and contains few detailed directives. As a result, it was possible to have a good deal of technical argument in the subsequent negotiations. The section on on-site inspections estimated that there would be from 20 to 100 earthquakes a year which would be undistinguishable on the basis of their seismic signals from deep underground nuclear explosions of about 5 kiloton yield, and it also stated that:

When the control posts detect an event which cannot be identified by the international control organ and which could be suspected of being a nuclear explosion, the international control organ can send an inspection group to the site of this event in order to determine whether a nuclear explosion had taken place or not.

This could be interpreted as a mandate for compulsory on-site inspection in the case of all unidentified events.

V
An Agreed Report: A Hopeful Sign?

Concluding Communiques
With the agreement on this point, except for matters involving the drafting and style of the report, the Conference of Experts had concluded its work. These matters were handled expeditiously, and on August 21 the Conference held its final session. The Conference then issued a public communiqué; the report itself was not pub-

73See the presentation by Robert F. Bacher: EXP/NUC/PV. 22, pp. 36-50.
75Ibid., p. 289.
lished for several days after the conclusion of the Conference. Public attention probably focused most on these words in the communique:

The Conference adopted an agreed conclusion regarding the technical equipment of the control system necessary for the detection and identification of nuclear explosions. The Conference reached the conclusion that it is technically feasible to set up, with certain capabilities and limitations, a workable and effective control system for the detections of violations of a possible agreement on the world-wide cessation of nuclear weapons tests.76

Probably most people tended to read this as saying—controls for a test ban are technically feasible. But was this an accurate representation of the work of the Conference?

In Geneva, among the Western delegations at least, there was a feeling of satisfaction that a difficult task had been completed. In the world at large, there was widespread public expectation that an arms control agreement might actually be in the offing. Dr. Fisk issued a communique which summed up the feeling of at least the American participants:

The Conference of Experts has completed its work. We on the Western side are gratified that the task set for this Conference, which began its work seven weeks ago, has been successfully accomplished.

That task was to seek a common understanding of the technical problems involved in the detection and identification of nuclear explosions. We have now reached such a common understanding, which is embodied in the report we have just agreed upon, and which we are now transmitting to our Governments. My colleagues and I are hopeful that this report, which carefully examines and sets forth the capabilities and limitations of present methods of detecting nuclear explosions, will prove helpful to all of our Governments in their future consideration of this important subject.

As scientists we have sought to establish the facts pertinent to our subject and to draw from them sound and logical conclusions regarding a system of control.77

But had their role simply been that of scientists attempting to establish the facts, and were Dr. Fisk's modesty, on the one hand, and optimism, on the other, warranted? Had not the scientists engaged in a role of extremely great political importance? And how happy should one be with a document which in fixed terms stated matters concerning which there was very little empirical data? It is one thing to have a scientific paper proved incorrect, but what would happen if an internationally agreed to document was proved incorrect?

Perhaps the basic question, however, was what would the United States do now in the light of this unexpected denouement. Even though at the outset the United States did not have any clear expectations in terms of broad strategy about the purpose of the Conference of Experts, now that there was an agreed report some fundamental decisions would surely have to be taken.