

some new bold step in arms control. He did not, and we were disappointed. But arms control was not the focus of his speech. His main point was that he was set on his new policy of openness and reform, that "it had taken time to develop this new view," and that it "involved revolutionary changes for the world and for socialism." "Our program is irreversible," he said, and "to carry it out we need peace." He assured the audience that "the desire to make the Soviet Union better will not hurt the rest of the world" and that Soviet security "cannot build on the insecurity of others."

Gorbachev then went on to review U.S.-Soviet arms control positions, and one clear statement stood out. Perhaps as an echo to Sakharov's remark several days before, he put forth the Soviet position on a possible SDI deployment: "The national sovereignty of a state extends to the atmosphere above it. Every state has the right to defend it from intrusion."

After the speech we adjourned to the usual Soviet-style standup dinner of caviar and sturgeon. Surrounded by a ring of bodyguards, Gorbachev mingled with the crowd and answered questions. There were no babies to kiss. What struck me most was the distance between Gorbachev's table and Sakharov's: 50 feet. In the future, a simple measurement of that physical separation may be the best indicator of the success of *glasnost*. The question is whether Sakharov will be restored to his former status and will even-

tually become a key Academy of Sciences adviser to the Soviet government.

A postscript: Perhaps the forum participants can now understand, in retrospect, Gorbachev's failure to announce new initiatives at the forum. Shortly afterward, the Soviet Union broke its moratorium on underground testing, perhaps a sign to the Soviet hardliners that Gorbachev could stand up to U.S. intransigence. Perhaps only by doing this first could he adopt Sakharov's position of decoupling from SDI and ICBM agreements and proposing his recent intermediate-range nuclear force (INF) reductions.

After the banquet I ran into Sakharov, who invited me home to dinner. Together with Jerome Wiesner and Jeremy Stone, I sat at the kitchen table eating ethnic specialties and being mothered by Yelena Bonner. The Sakharovs pointed out the huge amount of mail that arrived daily, that over 20 people each day knocked on their door to talk to Sakharov, and that the phone, as I had noticed previously, rang almost continuously. The talk ranged from ways to get Sakharov a phone-answering machine to Bonner's stories about the early days of collectivization.

On my return to the hotel I received a call from one of my former Soviet colleagues. He was sorry that he could not see me: my first telex had been sidetracked, the second had not been received. He promised to write. I am still waiting. □

A U.S. scientist addresses Gorbachev

The following is a speech delivered to General Secretary Mikhail Gorbachev, other senior officials of the Soviet government, and the 1,500 participants in the eight International Forums on Drastic Reductions in Nuclear Weapons for a Nuclear-Free World, at the Kremlin Palace, February 16, 1987.

by Frank von Hippel

THE MEMBERS of the Initiative Committee have asked me to give you a brief summary of our discussions in the International Scientists' Forum on the Problems of Drastic Reductions—and also of the discussions in two excellent workshops that were held in the days before the forum.

I would like to start with an old point—but one which scientific study makes ever clearer: the Soviet Union and the United States each possesses 10–100 times the destructive power that would be required to destroy either as a modern society. These levels of destructive power make the nuclear arms race a concern of the entire world. They also create opportunities for reductions by as much as 90 percent. Such reductions would have to be properly designed,

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however, to ensure the invulnerability of the reduced forces—a point to which I will return.

The large opportunities for reductions also provide the leaders of the United States and the Soviet Union with great freedom to experiment with unilateral initiatives as a way to build support for disarmament.

Mr. General Secretary, we are deeply conscious of the fact that you understand this very well and we are grateful to you for the effort you put into the Soviet unilateral moratorium on nuclear testing during the past 18 months. The impact of your moratorium continues to increase.

On a related point, we find the pervasive fears of disarming surprise attacks that help drive the arms race are greatly exaggerated: a large fraction of the nuclear weapons on each side remain safe because they are well hidden in the ocean or because they can escape the attack in aircraft or because they move. As a result, a surprise attack by either side would only succeed in reducing the total destructive power of the other by perhaps one-half—an insignificant result given the levels of destructiveness that both would possess even after 90 percent reductions. It is also critical to realize that an attempt at a disarming attack would kill tens of millions of people—making it both a crime against humanity and probably the first step toward the end of civilization.

With regard to the possibility of defense, we find that an effort by either side to protect itself against nuclear attack by building defenses appears hopeless. The leaderships

of both the United States and Soviet Union accepted this reality 15 years ago when they signed the treaty limiting antiballistic missile systems. The integrity of this treaty remains critical, since it stands in the way of a still more wasteful and dangerous arms race. The deployment of large-scale antiballistic missile systems would also dangerously reduce strategic stability.

At a workshop on the Anti-Ballistic Missile Treaty, which was held on the day before the forum, considerable progress was made in devising quantitative criteria that could be used to provide the basis for a common understanding of the prohibitions in the treaty against space-based antiballistic missile systems. We hope that the development of such an understanding could break the current impasse in Geneva.

It was also suggested that the Outer Space Treaty might be amended to ban space-based weapons of all types. Some participants in the forum felt, however, that space-based systems are so obviously foolish that they will probably never be deployed. They therefore argued that resolution of the controversy should not delay reductions agreements that may be achievable now. It could be made clear that any reductions would be reversed if, in fact, the Anti-Ballistic Missile Treaty was abandoned.

There was widespread agreement at the forum that a much more stable balance could be achieved at a 90 percent reduced level of nuclear weapons—primarily through the elimination of two large classes of offensive nuclear weapons.

The first class is multiple-warhead ballistic missiles. These weapons are being acquired today by both sides primarily because of their capabilities for attacking the nuclear weapons of the other side. This is a particularly dangerous form of old thinking. Both land- and submarine-based multiple-warhead ballistic missiles should therefore be eliminated or replaced by single-warhead missiles.

The other nuclear weapons that many of the participants thought should be eliminated are the short-range weapons that are designed to be used in battles between military forces on land or sea. These weapons are destabilizing because there would be pressures to use them in even small conflicts and, once they were used, the barrier to large-scale use would have been broken.

The proliferation of nuclear-armed cruise missiles is also a serious problem and they should be strictly limited.

Although there was broad agreement that there is no insuperable technical barrier to drastic reductions, many participants felt that further developments will be required before we can determine how to make the final step to complete abolition. We support the goal of abolition, however, as an essential part of a more hopeful future for humanity. We will make this objective a central part of our research agenda.

In this connection, the reaction in Western Europe to the Reykjavik discussions has made visible a large body of opinion that believes that the threat of non-nuclear war must be reduced at the same time as the threat of nuclear war.

Many of the participants in the forum were therefore very interested in an idea that is attracting increasing support in Europe.

This is the idea of reconstructing the military forces in Europe to appear less threatening. Advocates of such a reconstruction call it “nonoffensive” or “nonprovocative” defense and believe that it could contribute to a second wave of détente in Europe.

Mr. General Secretary, we believe that the Soviet Union and the United States should both become more seriously involved in discussions of the possibility of nonprovocative defensive postures in Europe.

An important workshop was held two days before the forum, on the technical methods for verifying threshold nuclear test bans. The major focus of discussions in this workshop was on a comparison between an on-site method recently suggested by the U.S. government for verifying the 150-kiloton threshold test ban and the seismic methods previously used.

The U.S. government planned to send experts to this workshop but, unfortunately, changed its mind. The literature on the on-site technique is publicly available, however, and has been reviewed by other U.S. and Soviet experts. The preliminary conclusion of these experts is that, in order to obtain reliable results with the on-site technique, many details of the testing arrangements would have to be revealed. Many of the workshop participants felt that the degree of intrusiveness would be greater than either nuclear weapons establishment would tolerate. If this proves to be the case, however, the seismic experts believe that seismic methods would give results almost as accurate as can be achieved by the on-site techniques. The seismic techniques—unlike the on-site technique—would also be usable for the verification of thresholds down to one kiloton.

The Scientists’ Forum also included an important discussion of international cooperative projects in science such as the recent rendezvous with Halley’s Comet. Such collaborations could help reverse the trend toward science being captured for military purposes.

Finally, we were especially pleased to be able to have the participation in our discussions of Academician Andrei Sakharov. He contributed in important ways to our technical discussions. Academician Sakharov also stressed the particular importance of openness and democratization to the building of public trust in the disarmament process—the theme for which he was awarded the Nobel Peace Prize. This view was widely shared in the forum.

Mr. General Secretary, we believe that your own continued personal commitment to the increased openness and democratization of the Soviet Union could, in the long term, be your greatest contribution to the ending of the nuclear arms race.

The participants in the forum appreciate having this opportunity to share our thoughts on these important matters with you. We hope that other world leaders will provide the international scientific community with similar opportunities. □