



## The Defense Counterproliferation Initiative Created

Prepared remarks of Defense Secretary Les Aspin to the National Academy of Sciences Committee on International Security and Arms Control, Washington, Dec. 7, 1993.

Thank you very much ... for coming this morning. I'm particularly pleased to be able to talk about this important topic before this audience because I know many of you have thought about this. It's something that's going to take all our best efforts.

The national security requirements of the United States have undergone fundamental change in just a few short years. We won the Cold War. The Soviet threat that dominated our strategy, doctrine, weapons acquisition and force structure for so long is gone. With it has gone the threat of global war. But history did not end with that victory and neither did threats to the United States, its people and its interests.

As part of the Bottom-up Review we began to think seriously about what threats we really face in this new era. We came up with four chief threats to the United States.

First, a new danger posed by the increased threat of proliferation of nuclear weapons and other weapons of mass destruction.

Second, regional dangers posed by the threat of aggression by powers such as Saddam Hussein's Iraq.

Third, the danger that democratic and market reforms will fail in the former Soviet Union, Eastern Europe and elsewhere. And finally, we recognize an economic danger to our national security. In the short run, our security is protected by a strong military; but in the long run, it will be protected by a strong economy.

Of these dangers, the one that most urgently and directly threatens

America at home and American interests abroad is the new nuclear danger.

The old nuclear danger we faced was thousands of warheads in the Soviet Union. The new nuclear danger we face is perhaps a handful of nuclear devices in the hands of rogue states or even terrorist groups. The engine of this new danger is proliferation.

### **Cold War Nuclear Danger**

Let us recall briefly how we dealt with the old nuclear danger — the nuclear danger of the Cold War era. We had three approaches: deterrence, arms control and a nonproliferation policy based on prevention. They worked.

Our policy of deterrence was aimed primarily at the Soviet Union. Our aim was to guarantee by the structure and disposition of our own nuclear forces that a nuclear attack on the United States or its allies would bring no profit and thus deter it.

We sought to stabilize these arsenals through arms control and eventually to shrink them through arms reduction. Our nonproliferation policy was aimed at preventing the spread of nuclear weapons by persuading most nations not to go nuclear and denying the materials and know-how to make bombs to those who pursued them. And, in fact, these weapons did not spread as quickly as many suggested.

But that was then and this is now. And now we face the potential of a greatly increased proliferation problem. This increase is the product of two new developments.

The first arises from the breakup of the former Soviet Union. The second concerns the nature of technology diffusion in this new era. Each of these developments profoundly changes the nature of the proliferation problem.

Let's look at the former Soviet Union. The continued existence of the former Soviet Union's arsenal amidst revolutionary change gives rise to four potential proliferation problems.

First, and most obvious, is that nuclear weapons are now deployed on the territory of four states. Before, there was one. The safe and secure transport and dismantlement of these weapons is one of the U.S. government's highest priorities.

Second, we have the potential for what I call "loose nukes." In a time of profound transition in the former Soviet Union, it is possible that nuclear weapons, or the material or technology to make them, could find their way to a nuclear black market.

Third, nuclear and other weapons expertise for hire could go to would-be proliferators.

Fourth, whatever restraint the former Soviet Union exercised over its client states with nuclear ambitions, such as North Korea, is much diminished. Regional power balances have been disrupted and old ethnic conflicts have re-emerged.

The other new development that exacerbates today's proliferation problem is a byproduct of growth in world trade and the rising tide of technology everywhere.

The world economy today is characterized by an ever-increasing

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volume of trade leading to ever greater diffusion of technology. Simply put, this will make it harder and harder to detect illicit diversions of materials and technology useful for weapons development.

Moreover, many potential aggressors no longer have to import all the sophisticated technology they need. They are "growing" it at home. The growth of indigenous technology can completely change the nonproliferation equation.

Potential proliferators are sometimes said to be "several decades behind the West." This is not much comfort. If a would-be nuclear nation is four decades behind in 1993, then it is at the same technological level as the United States was in 1953. By 1953, the United States had fission weapons. We were building intercontinental range bombers and were developing intercontinental missiles.

Realize, too, that most of the thermonuclear weapons in the United States arsenal today were designed in the 1960s using computers that were then known as "supercomputers." These same supercomputers are no more powerful than today's laptop personal computers that you can pick up at the store or order through the catalog.

These new developments tell us a couple of very important things. The first, of course, is that we face a bigger proliferation danger than we've ever faced before. But second, and most important, is that a policy of prevention through denial won't be enough to cope with the potential of tomorrow's proliferators.

In concrete terms, here is where we stand today. More than a score of countries — many of them hostile to the United States, our friends and our allies — have now or are developing nuclear, biological and/or chemical weapons —

and the means to deliver them. More than 12 countries have operational ballistic missiles and others have programs to develop them.

Weapons of mass destruction may directly threaten our forces in the field and, in a more subtle way, threaten the effective use of those forces. In some ways, in fact, the role of nuclear weapons in the U.S. scheme of things has completely changed.

### ***Nuclear Equalizer***

During the Cold War, our principal adversary had conventional forces in Europe that were numerically superior. For us, nuclear weapons were the equalizer. The threat to use them was present and was used to compensate for our smaller numbers of conventional forces.

Today nuclear weapons can still be the equalizer against superior conventional forces. But today it is the United States that has unmatched conventional military power, and it is our potential adversaries who may attain nuclear weapons. We're the ones who could wind up being the equalizee.

And it's not just nuclear weapons. All the potential-threat nations are at least capable of producing biological and chemical agents. They might not have usable weapons yet, and they might not use them if they do. But our commanders will have to assume that U.S. forces are threatened.

So the threat is real, and it is upon us today. President [Bill] Clinton directed the world's attention to it in his speech to the United Nations General Assembly in September. He said, "One of our most urgent priorities must be attacking the proliferation of weapons of mass destruction whether they are nuclear, chemical or biological, and the ballistic missiles that can rain them down on

populations hundreds of miles away. ... If we do not stem the proliferation of the world's deadliest weapons, no democracy can feel secure."

To respond to the president, we have created the Defense Counterproliferation Initiative. With this initiative, we are making the essential change demanded by this increased threat. We are adding the task of protection to the task of prevention.

In past administrations, the emphasis was on prevention. The policy of nonproliferation combined global diplomacy and regional security efforts with the denial of material and know-how to would-be proliferators. Prevention remains our pre-eminent goal. In North Korea, for example, our goals are still a nonnuclear peninsula and a strong nonproliferation regime.

The Defense Counterproliferation Initiative in no way means we will lesson our nonproliferation efforts. In fact, DoD's work will strengthen prevention.

What the Defense Counterproliferation Initiative recognizes, however, is that proliferation may still occur. Thus, we are adding protection as a major policy goal.

... At the heart of the Defense Counterproliferation Initiative, therefore, is a drive to develop new military capabilities to deal with this new threat. It has five elements: One, creation of the new mission by the president; two, changing what we buy to meet the threat; three, planning to fight wars differently; four, changing how we collect intelligence and what intelligence we collect; and finally, five, doing all these things with our allies.

Let's look at each in turn.

First point: new mission. President Clinton not only recognized the danger of the new threat, he gave us this new mission to cope with it. We have issued defense planning guidance to the services to make sure everyone understands what the president wants.

I have organized my own staff to reflect the importance of the new mission with the new position of assistant secretary of defense for nuclear security and counterproliferation.

Second point: what we buy. We

reviewing all relevant programs to see what we can do better. For example, we're looking at improved nonnuclear penetrating capabilities to deal with underground facilities.

Saddam Hussein, you'll recall, had a lot of underground facilities. These normal structures are totally vulnerable to our air strikes. We cannot let Saddam escape attack. We're also working hard on ways to hunt mobile missiles and the difficulties in finding Scuds in the Gulf war.

And of course, we have reorganized the Strategic Defense Command into the Ballistic Missile Defense Organization so that it concentrates on responding to ballistic missile threats that are here today.

We've also proposed a clarification of the ABM treaty. It would allow us to develop and test a missile defense system to deal with a real threat without undermining an important agreement. This is an essential element of our counterproliferation strategy.

Third point: how we fight wars. We're developing guidance for dealing with this new threat. We've directed the services to tell us how prepared they are for it. The Chairman of the Joint Chiefs of Staff and our regional commanders in chief — our CinCs — are developing a military planning process for dealing with adversaries who have weapons of mass destruction.

And our concerns are by no means limited to the nuclear threat. We have a new joint office to oversee all DoD biological defense programs. This is the first time the department has organized its collective expertise to deal with the tough biological defense problems we face.

Fourth point: intelligence. After the war with Iraq, we discovered that Saddam Hussein had a much more extensive nuclear weapons program going than we knew. Moreover, we learned during the war that we had failed to destroy his biological and chemical warfare efforts. We do not want to be caught like that again, so we are working to improve our counterproliferation intelligence.

As a first step, we are pursuing

## *We are paying special attention to the dangerous potential problem of weapons and nuclear material proliferating from the Soviet Union.*

an arrangement with the director of central intelligence to establish a new deputy director for military support in the intelligence community's nonproliferation center. And we're tripling the number of Defense Department experts assigned to the center. We're looking for intelligence that is useful militarily, not only diplomatically.

Fifth point: international cooperation. Our allies and security partners around the world have as much to be concerned about as we do. We have tabled an initiative with NATO to increase alliance efforts against proliferation of weapons of mass destruction.

We are also cooperating actively with the Japanese on deployment of theater missile defense systems there, and possibly on developing such systems together.

We are paying special attention to the dangerous potential problem of weapons and nuclear material proliferating from the Soviet Union.

### *Improving Security*

Under the Nunn-Lugar program, we are helping Russia, Belarus, Ukraine and Kazakhstan with the safe and secure dismantling of their nuclear weapons. And we're helping them improve the security of fissile material in both weapons and civilian nuclear facilities by helping them set up material control and accounting systems.

We are even including Russia in our attempt to reshape export controls on sensitive technology. The control system used to be aimed at the Eastern Bloc. Now we are incorporating former Eastern Bloc countries in our efforts to impede would-be proliferators.

The Defense Department can play a constructive role in balancing economics and security here. In this effort, we have been guided by the excellent work conducted by the National Academy of Sciences.

To sum up, we've undertaken a new mission. For many years we planned to counter the weapons of mass destruction of the former Soviet Union. Now, we've recognized a new problem and we're acting to meet it with counterproliferation.

At the same time, our initiative complements nonproliferation in three important ways: It promotes consensus on the gravity of the threat, helping to maintain the international nonproliferation effort. It reduces the military utility of weapons of mass destruction, while nonproliferation keeps up the price, making them less attractive to the proliferator. And it reduces the vulnerability of the neighbors of those holding these weapons, further reducing the motive to acquire them in self-defense.

We are in a new era. We have released our Bottom-up Review that provided a blueprint for our conventional forces for the years ahead. Our Defense Counterproliferation Initiative will allow us to deal with the number one threat identified in the BUR, and it will help provide the real strength America needs to meet the dangers we face.

The public expects nothing less from its Department of Defense than the right responses to the new world.

Thank you.

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# The Effects of Nuclear War

## Summary



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The Technology Assessment Board approves the release of this report, which identifies a range of viewpoints on a significant issue facing the U.S. Congress. The views expressed in this report are not necessarily those of the Board, OTA Advisory Council, or of individual members thereof.

## Foreword

This is an extract from OTA's study on the effects of nuclear war. The assessment was conducted in response to a request from the Senate Committee on Foreign Relations to examine the effects of a nuclear war on the populations and economies of the United States and the Soviet Union. It is intended, in the terms of the Committee's request, to "put what have been abstract measures of strategic power into more comprehensible terms."

The study examined a wide range of effects that nuclear war would have on civilians: direct effects from blast and radiation; and indirect effects from economic, social, and political disruption. Particular attention was paid to the ways in which the impact of a nuclear war would extend over time. Two of the study's principal findings are that conditions would continue to get worse for some time after a nuclear war ended, and that the effects of nuclear war that cannot be calculated in advance are at least as important as those which analysts attempt to quantify.

This summary of the full report contains three sections: a statement of the principal findings, a section entitled "Approach" which summarizes the analyses of the body of the full report, and a section which discusses the major "Uncertainties." The full report also contains, as an appendix, a fictional account entitled "Charlottesville," which was our effort to approach a question which is beyond the capabilities of scientific analysis: the effects of a nuclear war on the survivors.

This assessment was carried out under the direction of Dr. Peter Sharrman with the guidance of OTA's Assistant Director Lionel S. Johns. OTA is grateful for the assistance of its Nuclear War Effects Advisory Panel, chaired by Dr. David Saxon, President of the University of California, and for the assistance of the Congressional Research Service, the Department of Defense, the Arms Control and Disarmament Agency, and the Central Intelligence Agency. It should be understood, however, that OTA assumes full responsibility for this report and that it does not necessarily represent the views of any of these agencies or of individual members of the Advisory Panel.

Copies of the full report can be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. GPO stock #052-003-00668-5: \$4.75.



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# The Effects of Nuclear War

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At the request of the Senate Committee on Foreign Relations, the Office of Technology Assessment has undertaken to describe the effects of a nuclear war on the civilian populations, economies, and societies of the United States and the Soviet Union.

Nuclear war is not a comfortable subject. Throughout all the variations, possibilities, and uncertainties that this study describes, one theme is constant—a nuclear war would be a catastrophe. A militarily plausible nuclear attack, even “limited,” could be expected to kill people and to inflict economic damage on a scale unprecedented in American experience; a large-scale nuclear exchange would be a calamity unprecedented in human history. The mind recoils from the effort to foresee the details of such a calamity, and from the careful explanation of the unavoidable uncertainties as to whether people would die from blast damage, from fallout radiation, or from starvation during the following winter. But the fact remains that nuclear war is possible, and the possibility of nuclear war has formed part of the foundation of international politics, and of U.S. policy, ever since nuclear weapons were used in 1945.

The premise of this study is that those who deal with the large issues of world politics should understand what is known, and perhaps more importantly what is not known, about the likely consequences if efforts to deter and avoid nuclear war should fail. Those who deal with policy issues regarding nuclear weapons should know what such weapons can do, and the extent of the uncertainties about what such weapons might do.

## SECTION 1.—FINDINGS

1. The effects of a nuclear war that cannot be calculated are at least as important as those for which calculations are attempted. Moreover, even these limited calculations are subject to very large uncertainties.

Conservative military planners tend to base their calculations on factors that can be either controlled or predicted, and to make pessimistic assumptions where control or prediction are im-



struction that make it much more difficult to predict than blast damage. While it is proper for a military plan to provide for the destruction of key targets by the surest means even in unfavorable circumstances, the nonmilitary observer should remember that actual damage is likely to be greater than that reflected in the military calculations. This is particularly true for indirect effects such as deaths resulting from injuries and the unavailability of medical care, or for economic damage resulting from disruption and disorganization rather than from direct destruction.

For more than a decade, the declared policy of the United States has given prominence to a concept of "assured destruction:" the capabilities of U.S. nuclear weapons have been described in terms of the level of damage they can surely inflict even in the most unfavorable circumstances. It should be understood that in the event of an actual nuclear war, the destruction resulting from an all-out nuclear attack would probably be far greater. In addition to the tens of millions of deaths during the days and weeks after the attack, there would probably be further millions (perhaps further tens of millions) of deaths in the ensuing months or years. In addition to the enormous economic destruction caused by the actual nuclear explosions, there would be some years during which the residual economy would decline further, as stocks were consumed and machines wore out faster than recovered production could replace them. Nobody knows how to estimate the likelihood that industrial civilization might collapse in the areas attacked; additionally, the possibility of significant long-term ecological damage cannot be excluded.

**2. The impact of even a "small" or "limited" nuclear attack would be enormous.** Although predictions of the effects of such an attack are subject to the same uncertainties as predictions of the effects of an all-out attack, the possibilities can be bounded. OTA examined the impact of a small attack on economic targets (an attack on oil refineries limited to 10 missiles), and found that while economic recovery would be possible, the economic damage and social dislocation could be immense. A review of calculations of the effects on civilian populations and economies of major counterforce attacks found that while the consequences might be endurable (since they would be on a scale with wars and epidemics that nations have endured in the past), the number of deaths might be as high as 20 million. Moreover, the uncertainties are such that no government could predict with any confidence what the results of a limited attack or counterattack would be even if there was no further escalation.

from the enormous psychological shock of having discovered the extent of its vulnerability.

7. **From an economic point of view, and possibly from a political and social viewpoint as well, conditions after an attack would get worse before they started to get better.** For a period of time, people could live off supplies (and, in a sense, off habits) left over from before the war. But shortages and uncertainties would get worse. The survivors would find themselves in a race to achieve viability (i.e., production at least equaling consumption plus depreciation) before stocks ran out completely. A failure to achieve viability, or even a slow recovery, would result in many additional deaths, and much additional economic, political, and social deterioration. This postwar damage could be as devastating as the damage from the actual nuclear explosion.

## SECTION 2.—APPROACH

The scope of this study is both broader and narrower than that of most other studies on this subject. It is broader in three respects:

1. it examines a full range of possible nuclear attacks, with attacking forces ranging in extent from a single weapon to the bulk of a superpower's arsenal;
2. it deals explicitly with both Soviet attacks on the United States and U.S. attacks on the Soviet Union; and
3. it addresses the multiple effects of nuclear war, indirect as well as direct, long term as well as short term, and social and economic as well as physical.

Those effects that cannot be satisfactorily calculated or estimated are described qualitatively. But this report's scope is narrower than most defense analyses because it avoids any consideration of military effects; although it hypothesizes (among other things) missile attacks against military targets, only the "collateral" damage such attacks would inflict on the civilian society are examined.

The approach used was to look at a series of attack "cases," and to describe the various effects and overall impact each of them might produce. By analyzing the impact of the same attack case for both a U.S. attack on the Soviet Union and a Soviet attack on the United States, the report examines the significance of the different kinds of vulnerabilities of the two countries, and of-

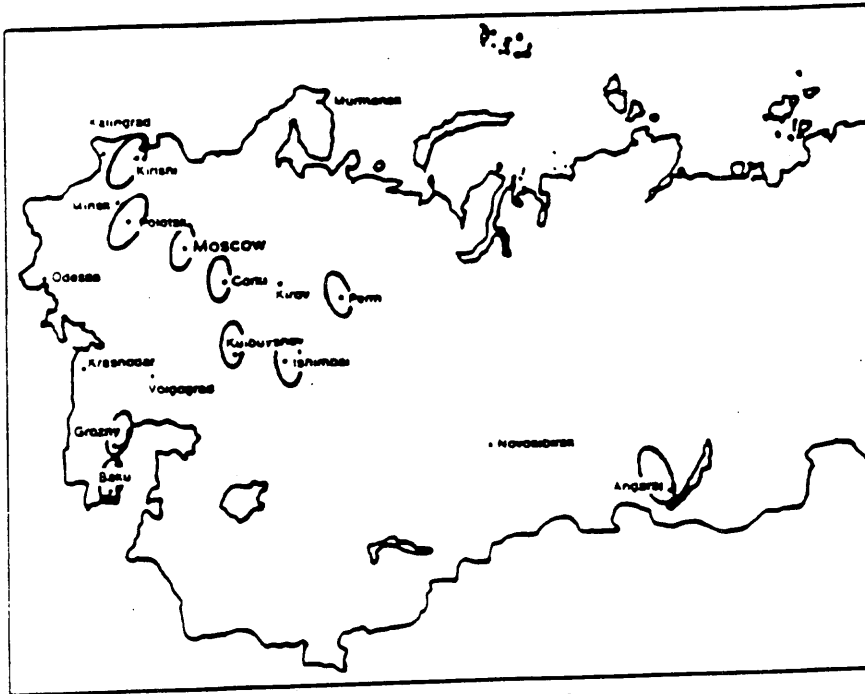


Photo credit: U.S. Air Force

A part of Hiroshima after atomic blast

**Case 2:** In order to examine the effects of a small attack on urban/industrial targets, the study examines a hypothetical attack limited to 10 SNDVs (strategic nuclear delivery vehicles, the term used in SALT to designate one missile or one bomber) on the other superpower's oil refineries. In "planning" this attack, which is not analogous to any described in recent U.S. literature, it was hypothesized that the political leadership instructed the military to inflict maximum damage on energy production using only 10 SNDVs without regard to the extent of civilian casualties or other damage. It was assumed that the Soviets would attack such targets with SS-18 missiles (each carrying 10 multiple independently targetable reentry vehicles, or MIRVs), and that the United States would use 7 MIRVed Poseidon missiles and 3 MIRVed Minuteman III missiles.

The calculations showed that the Soviet attack would destroy 64 percent of U.S. oil refining capacity, while the U.S. attack would destroy 73 percent of Soviet refining capacity. Calculations were also made of "prompt fatalities," including those killed by blast and fallout, assuming no special civil defense measures; they showed about 5 million U.S. deaths and about 1 million Soviet deaths. The results were different for the two coun-



Approximate footprint coverage of U.S. attack

Summary of U.S. Attack on U.S.S.R.

Footprint number	Geographic area (approx. center)	EMT <sup>a</sup>	Percent national refining capacity	Percent national storage capacity	Air burst prompt fatalities (x 1,000)	
					SS <sup>b</sup>	MS <sup>c</sup>
1	Moscow	1.20	10.5	2.1	52	41
2	Baku	0.95	9.8	1.5	224	152
3	Polotsk	1.20	8.7	2.8	25	12
4	Polotsk	0.92	7.5	0.3	52	32
5	Kuibyshev	1.20	7.4	3.1	127	83
6	Angarsk	0.92	6.9	0.4	130	54
7	Grozny	0.96	6.7	1.6	55	37
8	Kishinev	0.92	6.2	0.3	493	230
9	Gorki	1.20	5.6	1.5	228	153
10	Perm	0.96	3.6	2.1	61	42
Totals		10.44	72.9	15.7	1,458	836

<sup>a</sup>EMT = 200 kiloton megatons

<sup>b</sup>SS = 20 percent of population in single-story buildings

<sup>c</sup>MS = 20 percent of population in multi-story buildings

United States would attack most of the targets with Poseidon missiles which have small warheads, while the Soviets would use SS-18 intercontinental ballistic missiles (ICBMs) which carry much larger warheads, and large warheads cause more damage

if the construction is all houses, and about 800,000 if it is all apartment buildings. Perfect accuracy was assumed for missiles that are in fact somewhat inaccurate—some inaccuracy might reduce the extent of damage to the refineries, but it might well increase the number of deaths.

**Case 3:** In order to examine the effects on civilian populations and economies of counterforce attacks, the study examined attacks on ICBM silos and attacks on silos, bomber bases, and missile submarine bases. Such attacks have received fairly extensive study in the executive branch in recent years, so OTA surveyed a number of these studies in order to determine the range of possible answers, and the variations in assumptions that produce such a range. An unclassified summary of this survey appears as appendix D of the full report. (The complete survey, classified secret, is available separately.)

A counterforce attack would produce relatively little direct blast damage to civilians and to economic assets; the main damage would come from radioactive fallout. The uncertainties in the effects of fallout are enormous, depending primarily on the weather and on the extent of fallout sheltering which the population makes use of. The calculations made by various agencies of the executive branch showed a range in "prompt fatalities" (almost entirely deaths from fallout within the first 30 days) from less than 1 to 11 percent of the U.S. population and from less than 1 to 5 percent of the Soviet population. This shows just how great a variation can be introduced by modifying assumptions regarding population distribution and shelter.

What can be concluded from this? First, if the attack involves surface bursts of many very large weapons, if weather conditions are unfavorable, and if no fallout shelters are created beyond those that presently exist, U.S. deaths could reach 20 million and Soviet deaths more than 10 million. (The difference is a result of geography; many Soviet strategic forces are so located that fallout from attacking them would drift mainly into sparsely populated areas or into China.) Second, effective fallout sheltering (which is not necessarily the same thing as a program—this assumes people are actually sheltered and actually remain there) could save many lives under favorable conditions, but even in the best imaginable case more than a million would die in either the United States or the U.S.S.R. from a counterforce attack. Third, the "limited nature" of counterforce attacks may not be as significant as the enormous uncertainty regarding their results.

calculate the further millions who might eventually die of latent radiation effects are shown in chapter V of the full report.

What is clear is that from the day the survivors emerged from their fallout shelters, a kind of race for survival would begin. One side of the race would be the restoration of production: production of food, of energy, of clothing, of the means to repair damaged machinery, of goods that might be used for trade with countries that had not fought in the war, and even of military weapons and supplies. The other side of the race would be consumption of goods that had survived the attack, and the wearing-out of surviving machines. If production rises to the rate of consumption before stocks are exhausted, then viability has been achieved and economic recovery has begun. If not, then each postwar year would see a lower level of economic activity than the year before, and the future of civilization itself in the nations attacked would be in doubt. This report cannot predict whether this race for economic viability would be won. The answer would lie in the effectiveness of postwar social and economic organization as much as in the amount of actual physical damage. There is a controversy in the literature on the subject as to whether a postattack economy would be based on centralized planning (in which case how would the necessary data and planning time be obtained?), or to individual initiative and decentralized decision-making (in which case who would feed the refugees, and what would serve for money and credit?).

An obviously critical question is the impact that a nuclear attack would have on the lives of those who survive it. The case descriptions in the full report discuss the possibilities of economic, political, social, and psychological disruption or collapse. However, the recital of possibilities and uncertainties may fail to convey the overall situation of the survivors, especially the survivors of a large attack that included urban-industrial targets. In an effort to provide a more concrete understanding of what a world after a nuclear war would be like, OTA commissioned a work of fiction that appears in appendix C of the full report. It presents some informed speculation about what life would be like in Charlottesville, Va., assuming that this city escaped direct damage from the attack. The kind of detail that such an imaginative account presents—detail that proved to be unavailable for a comparable Soviet city—adds a dimension to the more abstract analysis in the body of the full report.

**Civil Defense:** Chapter III of the full report provides some basic information about civil defense measures, discusses the



Photo credit: U.S. Department of Defense

Photo credit: U.S. Air Force

The patient's skin is burned in a pattern corresponding to the dark portions of a kimono worn at the time of the explosion

Burn injuries from nuclear blasts

about the possibility of damage to the ozone layer than recent research would support.

The results of the case studies are summarized in the table on p. 22.

### SECTION 3.—UNCERTAINTIES

There are enormous uncertainties and imponderables involved in any effort to assess the effects of a nuclear war, and an effort to look at the entire range of effects compounds them. Many of these uncertainties are obvious ones: if the course of a snowstorm cannot be predicted 1 day ahead in peacetime, one must certainly be cautious about predictions of the pattern of radioactive fallout on some unknown future day. Similar complexities exist for human institutions: there is great difficulty in predicting the peacetime course of the U.S. economy, and predicting its course after a nuclear war is a good deal more dif-

difficult. The full report highlights the importance of three categories of uncertainties:

- Uncertainties in calculations of deaths and of direct economic damage resulting from the need to make assumptions about matters such as time of day, time of year, wind, weather, size of bombs, exact location of the detonations, location of people, availability and quality of sheltering, etc.
- Effects that would surely take place, but whose magnitude cannot be calculated. These include the effects of fires, the shortfalls in medical care and housing, the extent to which economic and social disruption would magnify the effects of direct economic damage, the extent of bottlenecks and synergistic effects, the extent of disease, etc.
- Effects that are possible, but whose likelihood is as incalculable as their magnitude. These include the possibility of a long downward economic spiral before viability is attained, the possibility of political disintegration (anarchy or regionalization), the possibility of major epidemics, and the possibility of irreversible ecological changes.

One major problem in making calculations is to know where the people will be at the moment when the bombs explode. Calculations for the United States are generally based on the 1970 census, but it should be borne in mind that the census data describes where people's homes are, and there is never a moment when everybody in the United States is at home at the same time. If an attack took place during a working day, casualties might well be higher since people would be concentrated in factories and offices (which are more likely to be targets) rather than dispersed in suburbs. For the case of the Soviet population, the same assumption is made that people are at home, but the inaccuracies are compounded by the unavailability of detailed information about just where the Soviet rural population lives. The various calculations that were used made varying, though not unreasonable assumptions about population location.

A second uncertainty in calculations has to do with the degree of protection available. There is no good answer to the question: "Would people use the best available shelter against blast and fallout?" It seems unreasonable to suppose that shelters would not be used, and equally unreasonable to assume that at a moment of crisis all available resources would be put to rational use. (It has been pointed out that if plans worked, people behaved rationally, and machinery were adequately maintained,



or birds and the destruction of insecticide factories have a synergistic effect? Another uncertainty is the possibility of organizational bottlenecks. In the most obvious instance, it would make an enormous difference whether the President of the United States survived. Housing, defined as a place where a productive worker lives as distinct from shelter for refugees, is another area of uncertainty. Minimal housing is essential if production is to be restored, and it takes time to rebuild it if the existing housing stock is destroyed or is beyond commuting range of the surviving (or repaired) workplaces. It should be noted that the United States has a much larger and more dispersed housing stock than does the Soviet Union, but that American workers have higher minimum standards.

There is a final area of uncertainty that this study does not even address, but which could be of very great importance. Actual nuclear attacks, unlike those described in the full report, would not take place in a vacuum. There would be a series of events that would lead up to the attack, and these events could markedly change both the physical and the psychological vulnerability of a population to a nuclear attack. Even more critical would be the events after the attack. Assuming that the war ends promptly, the terms on which it ends could greatly affect both the economic condition and the state of mind of the population. The way in which other countries are affected could determine whether the outside world is a source of help or of further danger. The postattack military situation (and nothing in this study addresses the effects of nuclear attacks on military power) could not only determine the attitude of other countries, but also whether limited surviving resources are put to military or to civilian use.

Moreover, the analyses in this study all assume that the war would end after the hypothetical attack. This assumption simplifies analysis, but it might not prove to be the case. How much worse would the situation of the survivors be if, just as they were attempting to restore some kind of economy following a massive attack, a few additional weapons destroyed the new centers of population and of government?

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Information on the operation of OTA, the nature and status of ongoing assessments, or a list of available publications may be obtained by writing or calling:

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**OTA Annual Report.**—Details OTA's activities and summarizes reports published during the preceding year.

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# **REPORT ON THE BOTTOM-UP REVIEW**



**Les Aspin  
Secretary of Defense**

**October 1993**

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## SECTION II

### A DEFENSE STRATEGY FOR THE NEW ERA

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The requirement to thwart new dangers and seize new opportunities sets the objectives our forces should try to achieve. The discussion below describes in more detail the dangers and opportunities we now foresee and outlines a strategy for dealing with them.

#### **Nuclear Dangers and Opportunities**

Dangers posed by nuclear weapons and other weapons of mass destruction (WMD) — that is, biological and chemical weapons — are growing. Beyond the five declared nuclear-weapon states (the United States, Russia, France, Great Britain, and China), at least 20 other nations either have acquired or are attempting to acquire weapons of mass destruction. In most areas where U.S. forces could potentially be engaged on a large scale, such as Korea or the Persian Gulf, our likely adversaries already possess chemical and biological weapons. Moreover, many of these same states (e.g., North Korea, Iraq, and Iran) appear to be embarked upon determined efforts to acquire nuclear weapons.

Weapons of mass destruction in the hands of a hostile power not only threaten U.S. lives but also challenge our ability to use force to protect our interests. The acquisition of nuclear weapons by a regional aggressor would pose very serious challenges. For example, a hostile nuclear-armed state could threaten:

- Its neighbors, perhaps dissuading friendly states from seeking our help to resist aggression.
- Concentrations of U.S. forces deployed in the region.
- Regional airfields and ports critical to U.S. reinforcement operations.
- American cities — either with covertly delivered weapons or, eventually, ballistic or cruise missiles.

We also continue to face nuclear dangers from the former Soviet Union (FSU). Although our relations with Russia are friendly and cooperative, and although the chances of U.S.-Russian military confrontation have declined dramatically and we are cooperating with the Russians to safely reduce their nuclear arsenal, Moscow still controls tens of thousands of nuclear weapons — a factor to be reckoned with should anti-Western elements take control of the Russian government. Even after START II is ratified and implemented, Russia will maintain a formidable nuclear arsenal of 3,000 to 3,500 deliverable weapons.

Moreover, several thousand strategic nuclear weapons from the former Soviet arsenal lie outside Russia. Although the leaders of Ukraine, Kazakhstan, and Belarus have pledged to eliminate the strategic nuclear arsenals on their territories, the disposition of these weapons remains uncertain. While at present we assess that those weapons are secure, increasing political and social disorder in these newly independent states could heighten the risk that nuclear weapons might be used accidentally, in an unauthorized manner, or could fall into the hands of terrorist groups or nations. There is also a danger that the materials, equipment, and know-how needed to make nuclear weapons could leak through porous borders to other nations.

Beyond the promise of continued reductions in the nuclear stockpile of the former Soviet Union, as well as in our own, there are other opportunities for the international community to reduce the danger of nuclear weapons and other weapons of mass destruction. With international cooperation to strengthen and expand existing agreements, it should be possible to slow, if not halt, further proliferation; reduce the size and aggregate destructive power of nuclear, chemical, and biological arsenals; and deter or prevent the actual use of these weapons. This will involve diplomatic means such as strengthening the provisions of and widening participation in the Nuclear Nonproliferation Treaty.

implementing the Chemical Weapons Convention and the Missile Technology Control Regime, and negotiating nuclear testing limitations.

However, in addition to cooperative threat reduction and nonproliferation efforts, the United States will need to retain the capacity for nuclear retaliation against those who might contemplate the use of weapons of mass destruction. We must also continue to explore other ways to improve our ability to counter proliferation, such as active and passive defenses against nuclear, biological, and chemical weapons and their delivery systems.

### Addressing Nuclear Dangers and Seizing Opportunities

Given this situation, our strategy for addressing the new dangers from nuclear weapons and other weapons of mass destruction and seizing opportunities to prevent their use must involve a multi-pronged approach.

First, it includes *nonproliferation* efforts to prevent the spread of weapons of mass destruction to additional countries through the strengthening of existing controls on the export of WMD technologies and materials and the improvement and expansion of international mechanisms and agreements for limiting and eliminating nuclear, biological, and chemical weapons.

Second, we must pursue *cooperative threat reduction* with the former Soviet Union, aimed at eliminating its stockpiles of nuclear, chemical, and biological weapons and preventing the spread of weapons of mass destruction, their components, and related technology and expertise within and beyond FSU borders.

While these first two efforts involve primarily diplomatic measures, DoD must also focus on *counterproliferation* efforts to deter, prevent, or defend against the use of WMD if our nonproliferation endeavors fail. Specifically, to address the new nuclear dangers, DoD must emphasize:

- Improvements in intelligence — both overall WMD threat assessments and timely intelligence and detection to support battlefield operations and management.
- Improvements in the ability of both our general purpose and special operations forces to seize, disable, or destroy arsenals of nuclear, biological, and chemical weapons and their delivery systems.
- Maintenance of flexible and robust nuclear and conventional forces to deter WMD attacks through the credible threat of devastating retaliation.
- Development of ballistic and cruise missile defenses, focused on the deployment of advanced theater missile defenses to protect forward-deployed U.S. forces and provision of the capability for a limited defense of the United States.
- Improved passive defenses, including better individual protective gear and better antidotes and vaccines for our forces in the event they are exposed to chemical or biological attacks.
- Other improved equipment, capabilities, and tactics to minimize the vulnerability of U.S. forces to WMD attacks.
- Better technologies to detect weapons transported covertly into the United States and elsewhere for terrorist purposes.

### Regional Dangers and Opportunities

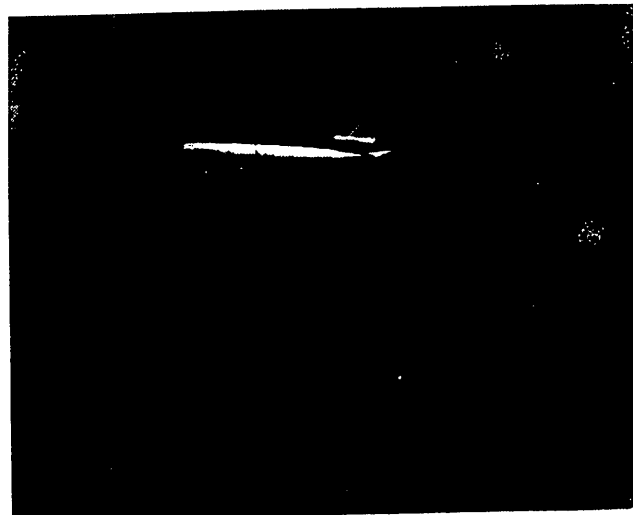
Regional dangers include a host of threats: large-scale aggression; smaller conflicts; internal strife caused by ethnic, tribal, or religious animosities; state-sponsored terrorism; subversion of friendly governments; insurgencies; and drug trafficking. Each of these dangers jeopardizes, to varying degrees, interests important to the United States.

U.S. Navy and Marine forces continue to play important roles in our approach to overseas presence operations. In recent years, we have sought to deploy a sizable U.S. naval presence — generally, a carrier battle group accompanied by an amphibious ready group — more or less continuously in the waters off Southwest Asia, Northeast Asia, and Europe (most often, in the Mediterranean Sea). However, in order to avoid serious morale and retention problems that can arise when our forces are asked to remain deployed for excessively long periods in peacetime, we will experience some gaps in carrier presence in these areas in the future.

In order to avoid degradations to our regional security posture, we have identified a number of ways to fill gaps in carrier presence or to supplement our posture even when carriers are present. For example, in some circumstances, we may find it possible to center naval expeditionary forces around large-deck amphibious assault ships carrying AV-8B attack jets and Cobra attack helicopters, as well as a 2,000-man Marine Expeditionary Unit. Another force might consist of a Tomahawk sea-launched cruise-missile-equipped Aegis cruiser, a guided missile destroyer, attack submarines, and P-3 land-based maritime patrol aircraft.

In addition to these "maritime" approaches to sustaining overseas presence, a new concept is being developed that envisions using tailored joint forces to conduct overseas presence operations. These "Adaptive Joint Force Packages" could contain a mix of air, land, special operations, and maritime forces tailored to meet a theater commander's needs. These forces, plus designated backup units in the United States, would train jointly to provide the specific capabilities needed on station and on call during any particular period. Like maritime task forces, these joint force packages will also be capable of participating in combined military exercises with allied and friendly forces.

Together, these approaches will give us a variety of ways to manage our overseas presence profile, balancing carrier availability with the deployment of other types of units. Given this flexible approach to provid-



*B-2 bombers being refueled by KC-10 tanker.*

ing forces for overseas presence, we can meet the needs of our strategy with a fleet of eleven active aircraft carriers and one reserve/training carrier.

## **Nuclear Forces**

The changing security environment presents significant uncertainties and challenges in planning our strategic nuclear force structure. In light of the dissolution of the Warsaw Pact, the breakup of the Soviet Union, the conclusion of the START I and II treaties, and our improving relationship with Russia, the threat of a massive nuclear attack on the United States is lower than at any time in many years.

However, a number of issues affecting our future strategic nuclear posture must still be addressed. Tens of thousands of nuclear weapons continue to be deployed on Russian territory and on the territory of three other former Soviet republics. Even under START II, Russia will retain a sizable residual nuclear arsenal. And, despite promising trends, the future political situation in Russia remains highly uncertain.

In addition, many obstacles must be overcome before the ratification of START II, foremost of which are Ukrainian ratification of START I and Ukraine's and Kazakhstan's accession to the Nuclear Nonproliferation Treaty as non-nuclear-weapon states —

a condition required by Russia prior to implementing START I. Moreover, even if these obstacles can be overcome, implementation of the reductions mandated in START I and II will not be completed for almost 10 years. Thus, while the United States has already removed more than 3,500 warheads from ballistic missile systems slated for elimination under START I (some 90 percent of the total required), in light of current uncertainties, we must take a measured approach to further reductions.

Two principal guidelines shape our future requirements for strategic nuclear forces: providing an effective deterrent while remaining within START I and II limits, and allowing for additional forces to be reconstituted in the event of a threatening reversal of events.

The Bottom-Up Review did not address nuclear force structure in detail. As a follow-up to the review, a comprehensive study of U.S. nuclear forces is being conducted. For planning purposes, we are evolving toward a future strategic nuclear force that by 2003 will include:

- 18 Trident submarines equipped with C-4 and D-5 missiles.
- 500 Minuteman III missiles, each carrying a single warhead.
- Up to 94 B-52H bombers equipped with air-launched cruise missiles and 20 B-2 bombers.

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### On Display At The National Atomic Museum

- Little Boy — Casings of the "gun" and "implosion" type atomic weapons that helped end World War II.
- B-52B — Bomber that dropped the last nuclear weapon tested in the atmosphere by the U.S.
- F105D — Fighter bomber that was designed to carry nuclear weapons.
- 280 MM Cannon — Artillery piece that could propel a 600 lb. nuclear shell more than 20 miles.
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## Fascinating, Detailed Exhibits at the Museum Cover:

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- Nuclear Weapons Safety
- Testing of Nuclear Weapons
- Atoms in Space
- Nuclear Technologies at Sea
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- Fusion
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## Films

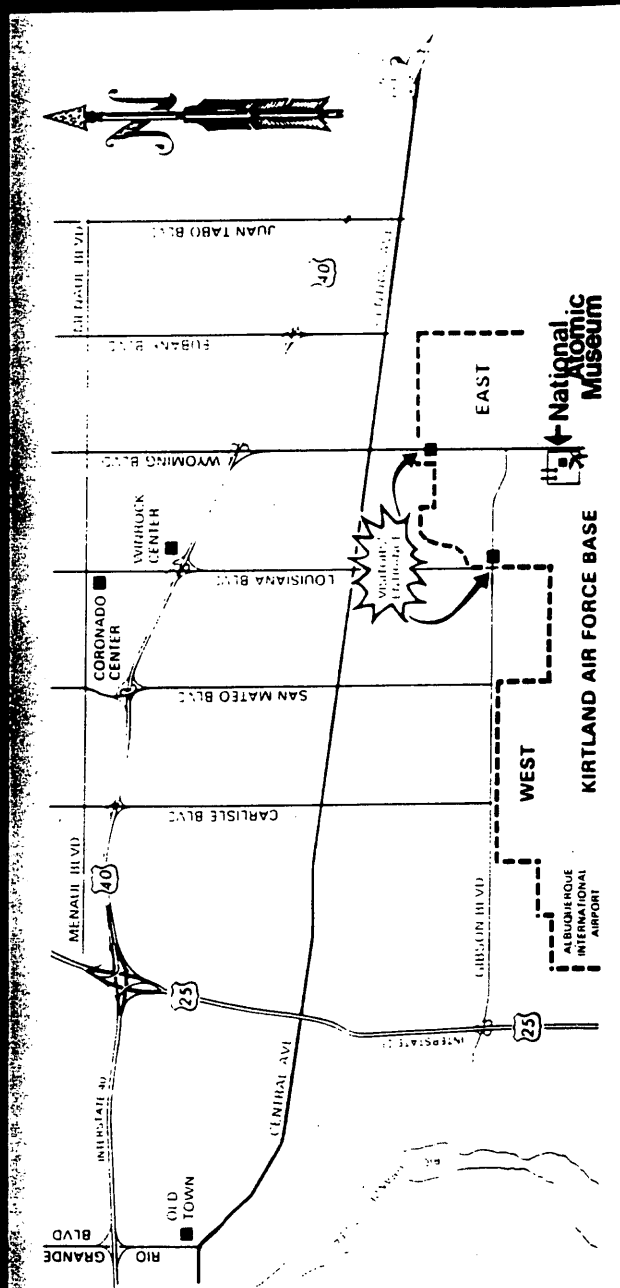
The classic documentary "Ten Seconds That Shook The World" is shown daily in the Museum theater. This excellent film depicts the entire history of the secret atom bomb project which was code named the "Manhattan Project." Other films are also shown.

Hours: 9 to 5 daily

Closed: New Years Day, Easter, Thanksgiving, Christmas

Please call (845-6670) for movie times and tour arrangements.

National Atomic Museum  
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## Directions to the Museum

Take Wyoming Blvd. (south) or Gibson Blvd. (east) onto Kirtland Air Force Base — stop and get a pass at the Gate before proceeding to the Museum. Museum is on Wyoming approximately one mile from guard gate (inside the base).