

Testimony Before
The Committee on Homeland Security and Governmental Affairs
United States Senate
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ACTIONS NOW FOR THE DAY AFTER:
FINDINGS OF THE PREVENTIVE DEFENSE DAY AFTER PROJECT

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Chairman Lieberman, Senator Collins, and members of the Committee, thank you for inviting me to testify before you on actions that would be necessary in the 24 hours following a nuclear detonation in an American city – presenting some of the results of what I and my collaborators call The Day After Project.

I applaud you for covering this terrible prospect, but I regret that you must do so. For while the probability of a nuclear weapon one day going off in a U.S. city cannot be calculated, it is almost surely larger than it was five years ago. North Korea has the bomb, reflecting the greatest failure of U.S. nonproliferation policy in a generation. Iran bids fair to follow. Pakistan's nuclear technology, already put on the market once by Abdul Qadeer Kahn, could go to terrorists if Pakistan grows unstable. Russia's arsenal remains incompletely secured 17 years after the end of the Cold War. And enrichment and reprocessing, the essential processes for producing highly enriched uranium and plutonium, respectively, could proliferate with the spread of nuclear power to generate carbon-free electricity.

Meanwhile, in the same five years, terrorism has surged into a global movement. More nuclear materials that can be lost or stolen plus more terrorists aspiring to mass destruction equals a greater probability of nuclear terrorism.

Former Senator Sam Nunn in 2005 framed the need for Washington to do better at changing this math with a provocative question: "On the day after a nuclear weapon goes off in an American city," he asked, "what would we wish we had done to prevent it?"

But in view of the increased risk in recent years, I and my collaborators – former Secretary of Defense William Perry and former Lawrence Livermore National Laboratory Director Michael May – decided we needed to ask a follow-on question to Nunn's: "What should we actually do on the Day After? What steps can our government take now to prepare for

that awful contingency?” Accordingly, we convened a workshop in Washington of leading government and non-government experts to consider this question under the auspices of the Harvard-Stanford Preventive Defense Project which Dr. Perry and I co-direct. My testimony summarizes the report of the workshop, authored by May, Perry, and me. The workshop was off-the-record, and none of its participants, listed at the end of my written testimony, is responsible for its content. The work was sponsored by the generosity of several foundations and received no government funds.¹ I should also mention that I co-chaired, with Ambassador Bob Joseph, a review for the Department of Defense of the programs of the Defense Threat Reduction Agency (DTRA), which would contribute critical technical capabilities to the national effort on the Day After; that report will be available after it passes security review.

Nothing I can tell you from our report would make the Day After anything less than the worst in the history of the Republic. No greater failure of our government’s duty to national security could occur than to let this catastrophic event befall our people. Yet it turns out that much could be done to save lives, reduce the cost to the country as a whole, and ensure that our nation, and civilization more broadly, endures. After all, the underlying dynamic would remain a few terrorists acting against the rest of us.

I will summarize our findings in five points.

But first I should make a “zeroth” point: A consideration of the realities of the Day After makes it such that our strongest recommendation to a president who finds himself or herself in this position is: “If I were in your shoes, I wouldn’t be in your shoes.” Terrorism probably cannot ever be entirely eradicated, since it has so many potential sources in the aberrant motivations of small groups of people or even individuals. But nuclear terrorism can be eradicated. The reason for this is a fortunate blessing of nature: making a nuclear bomb requires highly enriched uranium (HEU) or plutonium, and neither of these metals occurs in nature. They must be man-made. Nature’s second gift is to make it comparatively difficult to make either one. Enrichment and reprocessing are beyond the capabilities of even the most sophisticated terrorist group. It must obtain HEU or plutonium from the comparatively few governments – you can almost count them with two hands - that have taken the time and treasure to accomplish enrichment or reprocessing. If these governments safeguard their materials, there can be no nuclear terrorism. But after that, the laws of nature grow unkind: It is not beyond the ken of a competent terrorist group to make a bomb once it gets the material, especially if it is uranium. It is very difficult to detect these metals in transit, since neither is highly radioactive. And no vaccine can protect against the blast and radiation from a detonation. There is, therefore, no more important national security imperative than to prevent “loose nukes” at the source.

My co-authors and I have long worked on preventing nuclear danger. Perry and May made major contributions to nuclear deterrence and arms control during the Cold War. Perry led efforts to denuclearize Ukraine, Kazakstan, and Belarus while he was Secretary of Defense. I was privileged to run the historic Nunn-Lugar program in the Pentagon as Assistant Secretary of Defense during that period and to participate in these and other successful efforts to secure the

¹ The foundations that support the work of the Preventive Defense Project are: The Carnegie Corporation of New York, the John D. and Catherine T. MacArthur Foundation, the Richard Lounsbery Foundation, and the Herbert S. Winokur Fund.

Soviet nuclear legacy. Perry and I also participated in the 1994 North Korean nuclear crisis and then I served under him when he was North Korea Policy Coordinator later in the Clinton administration. It was therefore with great regret that we three felt compelled to initiate the Day After Project.

Our five principal findings refer to the detonation of a 10 kiloton weapon at ground level or in a building of a major American city. This is the same yield range as the Hiroshima and Nagasaki weapons and would represent a successful design effort by the perpetrators – North Korea, it appears, did not do as well in their underground test in 2007. The effects would be very different from the World War II bombings, however, since the Hiroshima and Nagasaki bombs were detonated high in the air over Japan and resulted in far less fallout.

1. Our first finding might seem obvious, but it is still not fully reflected in government planning: The scale of this disaster would quickly overwhelm even the most prepared city and state governments. To avoid repeating the Katrina fiasco on a much larger scale, Washington should not pretend that in the instance of nuclear terrorism its role can be to support state and local responders. And state and local governments – even though their actions to save lives and prevent panic in the first hours would be essential – must abandon the pretense that they could remain “in charge.” The federal government, led by the Department of Homeland Security, should have plans that foresee stepping in quickly, taking full responsibility, and devoting all the resources of the federal government. Related to this finding is that the assets of the Department of Defense will be required in the federal response, including for law enforcement. It was understandable in the early days after 9/11 that DOD showed reticence to involve itself in homeland security response – it had, after all, conflicts in Iraq and Afghanistan on its hands and feared a raid on the defense budget for homeland security. But that period has passed, and DOD should re-engage on the homeland security front.

2. Our second set of findings has to do with the immediate effects of the detonation. Within a circle about two miles in diameter – the length of the Mall here in Washington – the devastation from the blast would be near total. Then just downwind of that circle, in a cigar-shaped area a few miles long, the fallout would be severe enough to submit people who lived there to lethal doses of radiation even if they took modest shelter (for example, in a basement). If these people knew who they were (on a clear day they could just look in the sky and see the dust cloud coming their way, somewhat akin to the long plume of yellow dust from the Twin Towers wafting towards New Jersey on 9/11), they would have to evacuate quickly to avoid lethal exposure. Elsewhere in the city, where most of the inhabitants would in fact be working or sleeping, there would be more choices that emergency planners would need to manage. People upwind would not need to take any action. Downwind, but outside of the “hot” cigar, the best move for many people would be not to move at all, but to seek moderate shelter (somewhere where either mass shields them or distance attenuates the radiation reaching them). The worst thing for people to do in much of the downwind area would be to take to the highways at the same time, allowing the dust to settle on them when they were unsheltered and stuck in traffic. The radiation dose rate would drop off roughly in inverse proportion to the passage of time, so that after three days one could take three times as long to evacuate. Sheltering for this period of time would not be difficult and should not be compared to the Dr. Strangelove mineshaft-type civil defense fallout shelters of the 1950s. Managing the optimal mix of evacuation and

sheltering would be the responsibility of the government, which would need to be able to quickly predict the path of the plume, advise citizens, close some roads, and so on.

3. Our third set of findings deals with the long-term effects of the detonation, which are dominated by the problem of radiation. Radiation is unique to nuclear terrorism and uniquely frightening to most people. People far enough downwind that the radiation did not present an immediate danger could leave their homes or stay, leave for a while and come back, come back briefly to recover a pet or valuables, or never live in the area again. Their choices would be determined by the dose of radiation they would be willing to absorb. The doses far downwind (less than 50 rems total dose) would not make people die or even get sick. Instead, these “low” doses would only raise their statistical chance of getting cancer later in life and dying from it – raising it from 20 percent, which is the chance we all have on average – to something higher: 21 percent, 22 percent, up to 30 percent at the maximum survivable exposure. For the great majority of people downwind, the chance would be small enough (20.1 percent, let’s say), that they would not notice it themselves but the public health authorities would notice, years later, a greater cancer death rate in this population.

A critical matter related to low- and moderate-dose exposure has to do with the choices for first responders and troops sent to the stricken city. Few would choose to have their chance of dying of cancer rise from 20 percent to 30 percent. But in the case of small probabilities – 20.1 percent, for example, a first responder might be willing to go into the radiation zone for a short time. Protocols already exist that provide for higher permitted doses for workers in nuclear industries than for the public at large. These choices can ultimately only be made by individuals, but the protocols they follow must give them the best chance to know which areas are hotter than others and how long they can stay in the zone to accomplish their duties. Once a first responder had absorbed the permitted dose, he or she could no longer serve in the zone. All this obviously has huge implications for the competence of the response, for how it is planned, and for how many personnel must be rotated in and out of the zone.

4. Our fourth finding is perhaps the most important of all. It is the unpleasant fact that the first detonation probably won’t be the last...or at least it won’t feel that way. Let me explain. If terrorists manage to find enough material for a bomb, or to steal or buy a bomb, whose to say they didn’t get two, or three, or four from the same source? There is no technical or operational reason why nuclear terrorism should come one-at-a-time. What is absolutely clear is that terrorists will claim to have more after they detonate the first one – after all, their intent is to sow terror. Public officials will therefore have to behave as though there are more. The public surely will. Said differently, nuclear terrorism will not seem like an incident, but instead like a syndrome or campaign of terror. So people in other cities than the one struck will want to evacuate or at least move their children out of the cities, as the British did in World War II.

To prevent a second, third, and fourth detonation, the U.S. government – by now itself relocated out of Washington – will be desperately trying to find the terrorists and trace the source of the bombs. We know that the investigation must and surely will (aided by radiochemical

forensics²) ultimately lead to a government somewhere – Pakistan, North Korea, Russia, or any one of a dozen or so governments that operate hundreds of facilities where bombs or fissile material are stored – since the terrorists surely did not make the HEU or plutonium but instead stole, bought, or otherwise obtained it from a government facility somewhere. It has become something of a fad to say that the U.S. will retaliate against any government found to be the source of a bomb detonated on the U.S. And of course that would be a reasonable thing to consider if the government involved was in any way witting in the plot. But on the Day After, our national interest will take us in another direction – one of cooperation, not threats – since we will desperately need the help of those governments to track down the remaining bombs and put the campaign of nuclear terrorism to an end.

5. Our fifth and last set of findings has to do with the effects of the outbreak of nuclear terrorism on our society and government. I believe that the U.S. government itself, in a form recognizable to the citizenry as constitutional, would survive even if the first bomb struck Washington. On my first job in the Pentagon working for Caspar Weinberger, I had some involvement with the continuity of government effort to deal with the far more daunting task of “surviving the national command authority” under a rain of 3000 equivalent megatons of Soviet missile warheads. Then again in the Clinton administration after the Cold War ended, I saw this effort adapted to contingencies like nuclear terrorism. I am not current on these efforts, but I would be very surprised – especially after 9/11 – if they were not robust and well thought-out.

A bigger issue is survival of governance itself – of the people’s sense of well-being and safety...that their institutions were competent to respond to the emergency and protect them...that important things had been thought through in advance...that they were given good advice about how to act on the Day After...ultimately, that they could raise their children in big urban settlements. This is another reason, besides saving lives and property on the Day After, for us to think now about our response. It is also important that we anticipate now our natural impulse on the Day After to over-react. We should resolve now that any extraordinary measures taken on the Day After have a sunset clause, and that they undergo a total review periodically to see if they continue to strike the right balance between responding to nuclear terrorism and other objectives that constitute the good life in civil society.

This is also an appropriate note on which to close. The more competent and capable our government is on the Day After, and the more quickly and surely it can bring the campaign of nuclear terror to an end and make sure its recurrence is much less likely than it is now, and the less it is prone to panic and over-reaction, the less this awful event needs to lead to a change in our way of life. That is why it is important for the Congress and this Committee to address the Day After.

Thank you for inviting me to be with you.

² See *Nuclear Forensics: Role, State of the Art, Program Needs*, Report of a Joint Working Group of the American Physical Society and the American Association for the Advancement of Science, Michael M. May, chair, at <http://cstsp.aaas.org/content.html?contentid=1546>.

THE HONORABLE ASHTON B. CARTER

Professor Ashton Carter is chair of the International Relations, Security, and Science faculty at Harvard's Kennedy School of Government. He is also Co-Director (with former Secretary of Defense William J. Perry) of the Preventive Defense Project, a research collaboration of Harvard and Stanford Universities.

Dr. Carter served as Assistant Secretary of Defense for International Security Policy during President Clinton's first term. His Pentagon responsibilities encompassed: countering weapons of mass destruction worldwide, oversight of the U.S. nuclear arsenal and missile defense programs, policy regarding the collapse of the former Soviet Union (including its nuclear weapons and other weapons of mass destruction), control over sensitive U.S. exports, and chairmanship of NATO's High Level Group. He directed military planning during the 1994 crisis over North Korea's nuclear weapons program; was instrumental in removing all nuclear weapons from the territories of Ukraine, Kazakhstan, and Belarus; directed the establishment of defense and intelligence relationships with the countries of the former Soviet Union when the Cold War ended; and participated in the negotiations that led to the deployment of Russian troops as part of the Bosnia Peace Plan Implementation Force. Dr. Carter managed the multi-billion dollar Cooperative Threat Reduction (Nunn-Lugar) program to support elimination of nuclear, chemical, and biological weapons of the former Soviet Union, including the secret removal of 600 kilograms of highly enriched uranium from Kazakhstan in the operation code-named Project Sapphire. Dr. Carter also directed the Nuclear Posture Review and oversaw the Department of Defense's (DOD's) Counterproliferation Initiative. He directed the reform of DOD's national security export controls. His arms control responsibilities included the agreement freezing North Korea's nuclear weapons program, the extension of the Nuclear Nonproliferation Treaty, the negotiation of the Comprehensive Test Ban Treaty, and matters involving the START II, ABM, CFE, and other arms control treaties.

Dr. Carter was twice awarded the Department of Defense Distinguished Service Medal, the highest award given by the Department. For his contributions to intelligence, he was awarded the Defense Intelligence Medal. In 1987 Carter was named one of Ten Outstanding Young Americans by the United States Jaycees. He received the American Physical Society's Forum Award for his contributions to physics and public policy.

A longtime member of the Defense Science Board and the Defense Policy Board, the principal advisory bodies to the Secretary of Defense, Dr. Carter continues to advise the U.S. government as a member of Secretary of State Condoleezza Rice's International Security Advisory Board, co-chair of the Senate Foreign Relations Committee's Policy Advisory Group, a consultant to the Defense Science Board, a member of the National Missile Defense White Team, and a member of the National Academy of Sciences Committee on International Security and Arms Control. In 1997 Dr. Carter co-chaired the Catastrophic Terrorism Study Group with former CIA Director John M. Deutch, which urged greater attention to terrorism. From 1998 to 2000, he was deputy to William J. Perry in the North Korea Policy Review and traveled with him to Pyongyang. In 2001-2002, he served on the National Academy of Sciences Committee on Science and Technology for Countering Terrorism and advised on the creation of the Department of Homeland Security. He has testified frequently before the armed services, foreign relations, and homeland security committees of both houses of Congress.

In addition to his public service, Dr. Carter is currently a Senior Partner at Global Technology Partners and a member of the Board of Trustees of the MITRE Corporation, and the Advisory Boards of MIT's Lincoln Laboratories and the Draper Laboratory. He is a consultant to Goldman, Sachs and Mitretek Systems on international affairs and technology matters, and speaks frequently to business and policy audiences. Dr. Carter is also a member of the Aspen Strategy Group, the Council on Foreign Relations, the American Physical Society, the International Institute of Strategic Studies, and the National Committee on U.S.-China Relations. Dr. Carter was elected a Fellow of the American Academy of Arts and Sciences.

Dr. Carter's research focuses on the Preventive Defense Project, which designs and promotes security policies aimed at preventing the emergence of major new threats to the United States.

From 1990-1993, Dr. Carter was Director of the Center for Science and International Affairs at Harvard University's John F. Kennedy School of Government, and Chairman of the Editorial Board of *International Security*. Previously, he held positions at the Massachusetts Institute of Technology, the Congressional Office of Technology Assessment, and Rockefeller University.

Dr. Carter received bachelor's degrees in physics and in medieval history from Yale University, summa cum laude, Phi Beta Kappa. He received his doctorate in theoretical physics from Oxford University, where he was a Rhodes Scholar.

In addition to authoring numerous articles, scientific publications, government studies, and Congressional testimonies, Dr. Carter co-edited and co-authored eleven books, including *Keeping the Edge: Managing Defense for the Future* (2001), *Preventive Defense: A New Security Strategy for America* (1997), *Cooperative Denuclearization: From Pledges to Deeds* (1993), *A New Concept of Cooperative Security* (1992), *Beyond Spinoff: Military and Commercial Technologies in a Changing World* (1992), *Soviet Nuclear Fission: Control of the Nuclear Arsenal in a Disintegrating Soviet Union* (1991), *Managing Nuclear Operations* (1987), *Ballistic Missile Defense* (1984), and *Directed Energy Missile Defense in Space* (1984).

PREVENTIVE DEFENSE PROJECT

A RESEARCH COLLABORATION OF STANFORD & HARVARD UNIVERSITIES
WILLIAM J. PERRY & ASHTON B. CARTER, CO-DIRECTORS

The Day After: Action in the 24 Hours Following a Nuclear Blast in a U.S. City

**A Workshop of the Preventive Defense Project
Thursday, April 19, 2007**

- Attendees -

General John Abizaid, USA

Former Commander, U.S. Central Command

Dr. David M. Abshire

President, Center for the Study of the Presidency and
President, Richard Lounsbery Foundation

Dr. Michael R. Anastasio

Director, Los Alamos National Laboratory

Dr. Deana Arsenian

Senior Program Officer, International Peace & Security,
Carnegie Corporation of New York

Ambassador Linton F. Brooks

Former Administrator, National Nuclear Security
Administration, U.S. Department of Energy

Dr. Matthew Bunn

Senior Research Associate, STPP, Harvard University,
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Dr. Ashton B. Carter

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General James E. Cartwright, USMC

Commander, U.S. Strategic Command

Mr. Charles B. Curtis

President & Chief Operating Officer, Nuclear Threat
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Mr. William Daitch, SES

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Dr. Steve Fetter

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Mr. Shane Harris

Intelligence & Homeland Security Correspondent, The
National Journal

The Honorable Jane Lakes Harman

Congresswoman, U.S. House of Representatives

Dr. John Harvey

Director, Policy Planning Staff, National Nuclear Security
Administration, U.S. Department of Energy

Mr. Spencer S. Hsu

Homeland Security Correspondent, The Washington Post

The Honorable Fred C. Iklé

Distinguished Scholar, Center for Strategic &
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LTG Joseph R. Inge, USA

Deputy Commander, U.S. Northern Command

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Dr. Vahid Majidi

Assistant Director, Weapons of Mass Destruction
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Dr. Michael M. May

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Senior Fellow, Merrill Center for Strategic Studies, Paul H. Nitze School of Advanced International Studies, Johns Hopkins University

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Former Director, Non-Proliferation Center, CIA and Deputy Director, WMD Commission

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Deputy Commander, U.S. Special Operations Command

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Vice Admiral Roger T. Rufe, Jr. (USCG, Ret)

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The Day After

**Action in the 24 Hours Following a Nuclear Blast
in an American City**

**Ashton B. Carter, Michael M. May,
and William J. Perry**

*A Report Based on a Workshop
Hosted by*

The Preventive Defense Project
Harvard and Stanford Universities
Ashton B. Carter and William J. Perry, Co-Directors

Full text of report available

at: http://belfercenter.ksg.harvard.edu/files/dayafterworkshopreport_may2007.pdf

June 12, 2007; A-24

OP-ED CONTRIBUTOR

After the Bomb

By WILLIAM J. PERRY, ASHTON B. CARTER and MICHAEL M. MAY

THE probability of a nuclear weapon one day going off in an American city cannot be calculated, but it is larger than it was five years ago. Potential sources of bombs or the fissile materials to make them have proliferated in North Korea and Iran. Russia's arsenal remains incompletely secured 15 years after the end of the Soviet Union. And Pakistan's nuclear technology, already put on the market once by Abdul Qadeer Khan, could go to terrorists if the president, Gen. Pervez Musharraf, cannot control radicals in that country.

In the same period, terrorism has surged into a mass global movement and seems to gather strength daily as extremism spills out of Iraq into the rest of the Middle East, Asia, Europe and even the Americas. More nuclear materials that can be lost or stolen plus more terrorists aspiring to mass destruction equals a greater chance of nuclear terrorism.

Former Senator Sam Nunn in 2005 framed the need for Washington to do better at changing this math with a provocative question: On the day after a nuclear weapon goes off in an American city, "what would we wish we had done to prevent it?" But in view of the increased risk we now face, it is time to add a second question to Mr. Nunn's: What will we actually do on the day after? That is, what actions should our government take?

It turns out that much could be done to save lives and ensure that civilization endures in such terrible circumstances. After all, the underlying equation would remain a few terrorists acting against all the rest of us, and even nuclear weapons need not undermine our strong societies if we prepare to act together sensibly. Sadly, it is time to consider such contingency planning.

First and foremost, the scale of disaster would quickly overwhelm even the most prepared city and state governments. To avoid repeating the Hurricane Katrina fiasco on

a much larger scale, Washington must stop pretending that its role would be to support local responders. State and local governments — though their actions to save lives and avoid panic in the first hours would be essential — must abandon the pretense that they could remain in charge. The federal government, led by the Department of Homeland Security, should plan to quickly step in and take full responsibility and devote all its resources, including those of the Department of Defense, to the crisis.

Only the federal government could help the country deal rationally with the problem of radiation, which is unique to nuclear terrorism and uniquely frightening to most people. For those within a two-mile-wide circle around a Hiroshima-sized detonation (in Washington, that diameter is the length of the Mall; in New York, three-fourths the length of Central Park; in most cities, the downtown area) or just downwind, little could be done. People in this zone who were not killed by the blast itself, perhaps hundreds of thousands of them, would get radiation sickness, and many would die.

But most of a city's residents, being farther away, would have more choices. What should they do as they watch a cloud of radioactive debris rise and float downwind like the dust from the twin towers on 9/11? Those lucky enough to be upwind could remain in their homes if they knew which way the fallout plume was blowing. (The federal government has the ability to determine that and to quickly broadcast the information.) But for those downwind and more than a few miles from ground zero, the best move would be to shelter in a basement for three days or so and only then leave the area.

This is a hard truth to absorb, since we all would have a strong instinct to flee. But walking toward the suburbs or sitting in long traffic jams would directly expose people to radiation, which would be the most intense on the day after the bomb went off. After that, the amount would drop off day by day (one-third as strong after three days, one-fifth as strong after five days, and so on), because of the natural decay of the radioactive components of the fallout.

More tough decisions would arise later. People downwind could leave their homes or stay, leave for a while and then come back or leave and come back briefly to retrieve valuables. The choices would be determined by the dose of radiation they were willing to absorb. Except in the hot zone around the blast and a few miles downwind, even unsheltered people would not be exposed to enough radiation to make them die or even become sick. It would be enough only to raise their statistical chance of getting cancer

later in life from 20 percent (the average chance we all have) to something greater — 21 percent, 22 percent, up to 30 percent at the maximum survivable exposure.

Similar choices would face first responders and troops sent to the stricken area: how close to ground zero could they go, and for how long? Few would choose to have their risk of death from cancer go up to 30 percent. But in cases of smaller probabilities — an increase to 20.1 percent, for example — a first responder might be willing to go into the radiation zone, or a resident might want to return to pick up a beloved pet. These questions could be answered only by the individuals themselves, based on information about the explosion.

Next comes the unpleasant fact that the first nuclear bomb may well not be the last. If terrorists manage to obtain a weapon, or the fissile material to make one (which fits into a small suitcase), who's to say they wouldn't have two or three more? And even if they had no more weapons, the terrorists would most likely claim that they did. So people in other cities would want to evacuate on the day after, or at least move their children to the countryside, as happened in England during World War II.

The United States government, probably convened somewhere outside Washington by the day after, would be urgently trying to trace the source of the bombs. No doubt, the trail would lead back to some government — Russia, Pakistan, North Korea or other countries with nuclear arsenals or advanced nuclear power programs — because even the most sophisticated terrorist groups cannot make plutonium or enrich their own uranium; they would need to get their weapons or fissile materials from a government.

The temptation would be to retaliate against that government. But that state might not even be aware that its bombs were stolen or sold, let alone have deliberately provided them to terrorists. Retaliating against Russia or Pakistan would therefore be counterproductive. Their cooperation would be needed to find out who got the bombs and how many there were, and to put an end to the campaign of nuclear terrorism. It is important to continue to develop the ability to trace any bomb by analyzing its residues. Any government that did not cooperate in the search should, of course, face possible retaliation.

Finally, as buildings and lives were destroyed, so would the sense of safety and well-being of survivors, and this in turn could lead to panic. Contingency plans for the day after a nuclear blast should demonstrate to Americans that all three branches of

government can work in unison and under the Constitution to respond to the crisis and prevent further destruction.

A council of, say, the president, the vice president, the speaker of the House and the majority leader of the Senate, with the chief justice of the Supreme Court present as an observer, could consider certain aspects of the government's response, like increased surveillance. Any emergency measures instituted on the day after should be temporary, to be reviewed and curtailed as soon as the crisis ends.

Forceful efforts to prevent a nuclear attack — more forceful than we have seen in recent years — may keep the day from coming. But as long as there is no way to be sure it will not, it is important to formulate contingency plans that can save thousands of lives and billions of dollars, prevent panic and promote recovery. They can also help us preserve our constitutional government, something that terrorists, even if armed with nuclear weapons, should never be allowed to take away.

William J. Perry, a professor at Stanford, and Ashton B. Carter, a professor at Harvard, were, respectively, the secretary and an assistant secretary of defense in the Clinton administration. Michael M. May, also a professor at Stanford, is a former director of the Lawrence Livermore National Laboratory.