
US Political Realities in Downsizing Nuclear Arsenals

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US President Barack Obama has made very clear his goal of ridding the world of nuclear weapons. Articulated to some degree during the 2008 presidential campaign, Obama plainly laid out his agenda during his 5 April 2009 speech in Prague. This idea, as old as the Baruch plan advanced in 1946, laid out again in 1985 by President Ronald Reagan and more recently articulated by senior statesmen in several countries, has attracted widespread support. However, there has been significant resistance to this notion, including from within the US Government. This article explores this resistance and the possibilities for President Obama to realise this goal in the near- and mid-term, in both the political and technical contexts.¹

The Political Context

President Obama has clearly stated, on several occasions, that he wants to set the United States on a course that would result in the eventual global elimination of nuclear weapons. In his speech in Prague in April of 2009, he said, "I state clearly and with conviction America's commitment to seek the peace and security of a world without nuclear weapons." President Obama then outlined the steps necessary to make his vision a reality. These steps include:

- Further, verifiable, reductions of the stockpiles held by the United States and Russia;
- Ratification and entry into force of the Comprehensive Test Ban Treaty;
- Negotiations to reduce the number of non-deployed and non-strategic (or tactical) nuclear weapons held by the United States and Russia;
- Negotiations and entry into force of agreements to reduce other nations' nuclear stockpiles;
- Negotiation and entry in to force of an agreement to stop the global production of weapons-usable fissile material;

¹ The author thanks Pierce Corden, Gerald Epstein, and Sarah Williams for their insights.

- Finding ways to apply more intrusive inspections of all existing and new nuclear facilities in all countries, including the United States; and
- Finding ways to internationalise the nuclear fuel cycle.

This is an ambitious agenda, but without these steps—and others—it is clear that significant further reductions of nuclear weapons, let alone their eventual elimination, are extremely unlikely to be achieved. Ridding the world of nuclear weapons will be hard and will likely take decades. President Obama noted how difficult it will be for the United States to eliminate its own arsenal in his Prague speech;

As long as these weapons exist, the United States will maintain a safe, secure and effective arsenal to deter any adversary, and guarantee that defense to our allies.

The United States will continue to maintain its nuclear weapons—in a fashion proposed by the nuclear weapons laboratories and supported by the president—until it decides they are no longer needed.

President Obama seems determined to convert his rhetoric into reality. Over the course of several weeks during the spring of 2010, significant progress was made in advancing his goals. President Obama and Russian President Dmitri Medvedev signed a bilateral arms control treaty colloquially known as New START. The Obama administration also announced its nuclear doctrine via the *Nuclear Posture Review*—which had no classified version or annex, a first for the United States. In addition, President Obama hosted forty-four world leaders for an important meeting on the somewhat obscure issue of fissile material protection; this meeting engendered substantial commitments from nearly all the participants to either take specific actions to reduce the access to fissile materials in their countries or to provide funding for other countries to complete such work. Further, the administration and other national participants agreed to reconvene in South Korea in 2012. The spring of 2010 also saw a successful Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons. This RevCon was notable not for the particular progress made at the meeting, but instead because it was the first one in a decade at which the various parties to the treaty were able to agree on anything.

Unfortunately, the Obama administration is moving curiously slowly in several key areas. Many important offices have been empty for a long time, or were filled only recently. The director of the Domestic Nuclear Detection Office, inside the Department of Homeland Security and responsible for coordinating efforts to track smuggled fissile materials or nuclear weapons, was appointed in August, after an acting director led the office for eighteen months. A candidate for Deputy Administrator for Defense Nuclear Nonproliferation at the National Nuclear Security Administration (NNSA) was

nominated during the early summer of 2010. That office was also vacant for eighteen months. The office of policy planning at the NNSA is still leaderless. The President's deputy science advisor for national security issues was named in March of 2010 and his nomination languished in the Senate confirmation process for four months before being granted a temporary appointment. At the Department of State, the Bureau of International Security and Nonproliferation—the group charged with “spearheading efforts to promote international consensus on WMD proliferation through bilateral and multilateral diplomacy”²—has been led by an *acting* assistant secretary, detailed from the intelligence community, as its leader since Obama came into office. Some of these delays can be attributed to Republican intransigence, but someone can only be blocked *after* they've been nominated.

Let us next consider to the legislative branch. The last fifteen years have seen a marked decrease in the number of members of Congress with knowledge of—let alone interest in—matters regarding nuclear weapons, nuclear power, and arms control. Two lions of arms control, Senators Samuel Nunn and John Glenn retired in 1997 and 1999, respectively. Congressman Curtis Weldon, former Vice Chairman of the House Armed Service Committee and an advocate for engagement with Russia, lost his re-election bid in 2006. Congressman David Hobson retired in 2009, after serving for six years as the Chairman of the House Appropriations Subcommittee on Energy and Water Development; during his tenure as Chairman he was deeply engaged in issues relating to modernising US nuclear weapons and the US nuclear weapons complex. Senator Peter Domenici, long-time advocate for the US nuclear weapons labs and Chairman or Ranking Minority Member of the Senate Appropriations Subcommittee on Energy and Water Development, also retired in 2009. Congresswoman Ellen Tauscher, until 2009, served as Chair of the House Armed Services Subcommittee on Strategic Forces, and is now the Undersecretary of State for Arms Control and International Security. Senator Edward Kennedy, another long-time leader on arms control efforts, passed away in 2009. There are now no members in either the House or the Senate serving as the chair or ranking minority member of a committee with jurisdiction over nuclear weapons issues that have any significant part of the nuclear weapons complex in their state or district. Although having such facilities in their district might be thought to give these leaders a parochial view of nuclear weapons policy, it would also serve to ensure that they gained a detailed familiarity with and interest in nuclear weapons issues.

With changes in elected officials come changes in staff. The successors to the members of Congress listed above have all largely turned to new interest areas and new staff and have rarely shared their predecessors' interests in arms control and nuclear weapons issues. Other sources of expertise have

² US Department of State, <<http://www.state.gov/t/isn/>> [Accessed 6 November 2010].

also been lost. The Arms Control and Foreign Policy Caucus,³ founded in 1966, helped focus attention on a variety of issues through reports, draft amendments, and work with congressional leadership on vote counting. It served as a forum in which members with diverse political backgrounds and especially those who lacked substantial foreign policy expertise could “feel their way along on issues that weren’t being talked about in the Foreign Affairs or Armed Services Committees.”⁴ At one time, the Arms Control Caucus “counted among its membership fully one-quarter of the House and Senate.”⁵ After the arrival of the 1994 Republican “Contract with America” the caucus was forced to fire its professional staff. This left only a handful of committee and personal office staff that had any experience with arms control issues. The Office of Technology Assessment (OTA), created in 1972 and staffed by dozens of PhD scientists and engineers, served Congress by producing detailed and objective studies of a variety of technical issues, including arms control. Like the Arms Control Caucus, OTA was shut down in 1995, leaving Congress with diminished access to independent technical analysis.

As the number of members and staff with interest and expertise in arms control issues has declined, the issues themselves have become more complex. During the early years of the Cold War, the question was essentially “how many new nuclear weapons do we build?” Later, when arms control began in earnest, the conversation shifted to concerns about how to verify reductions in others’ nuclear stockpiles while introducing new weapons into that of the United States. However, the United States was primarily concerned with one other nuclear power, the Soviet Union, and it was a time when the US nuclear weapons complex was in a constant cycle of designing, testing, and building ever newer weapons and an amazing array of variations in design, size, and presumed use.

Today’s circumstances bring a new level of technical and political complexity. In addition to the Russian nuclear stockpile, the United States is increasingly concerned about the arsenals of China, India and Pakistan. A. Q. Khan helped to proliferate both uranium enrichment technology and designs for nuclear weapons. The United States went to war in Iraq allegedly because of a suspected nuclear weapons program. North Korea has withdrawn from the Non-Proliferation Treaty and has twice tested nuclear devices. Iran is pursuing a domestic nuclear power program,

³ From Susan W. Hammond, *Congressional Caucuses in National Policy Making* (Baltimore, MD: Johns Hopkins University Press, 2001). The Arms Control and Foreign Policy Caucus was open to any member of Congress who “subscribes to its general purposes of coordinating congressional concern for world peace into specific action for the development of international cooperation, a strengthened United Nations, and arms control and disarmament” (*Congressional Yellow Book 1992*, VI-37).

⁴ *Ibid.*, p. 172.

⁵ Richard A. Melanson, *American Foreign Policy Since the Vietnam War* (New York: Sharpe, 2005).

including uranium enrichment and plutonium reprocessing technologies that many observers suspect are part of a weapons program. Further, the United States has not designed a completely new nuclear weapon since the mid-1980s, has not built a new nuclear weapon from scratch since 1989, and has not explosively tested a nuclear weapon since 1992. While the Science-Based Stockpile Stewardship Program (SSP) has been quite successful in maintaining the US nuclear arsenal since testing stopped, some members of the nuclear weapons community are calling for new designs, new construction, and new facilities. Finally, the importance of technical verification of arms control treaties increases as stockpiles decrease: miscounting one hundred weapons out of 1,000 has a far greater impact than miscounting one hundred out of 20,000.

While Congress has been compelled to address the occasional nuclear-related topic, such as the Reliable Replacement Warhead, the Robust Nuclear Earth Penetrator, and nuclear programs in Iran and North Korea, attention has quickly returned to the wars in Afghanistan and Iraq, energy and climate change, and, most recently, the financial and economic crises. President Obama has made plain his plans to decrease the US nuclear stockpile and to reinvigorate arms control efforts. But he cannot accomplish this without significant support from Congress, and the current state of Congressional understanding of nuclear weapons will make gaining this support difficult. The default position on security issues for those members without confidence in their own knowledge or experience will usually be the most conservative, meaning one in which security is thought to rest on one's own weapons systems and not on any negotiated agreement or tacit understanding to engage in mutual restraint.

To understand how Congress will react to the President's proposal, we need to consider the two houses of Congress separately. The House and Senate have different ways of working and, more importantly, different roles to play. The role of the Senate is more obvious, given its constitutionally mandated role to provide advice and consent to the ratification of treaties. For decades, usually after many hearings and much debate on the floor of the Senate, arms control treaties have been approved with overwhelming, bipartisan majorities. The first departure from that practice was in 1999 when the Senate voted 51-48 to withhold its advice and consent to the ratification of the Comprehensive Nuclear-Test-Ban Treaty. This marked the first time a security-related treaty had been defeated since the vote on the Treaty of Versailles, nearly eighty years prior.⁶ The next arms control treaty to be considered was the Strategic Offensive Reductions or SORT Treaty, sometimes called the Moscow Treaty, in 2002. This treaty was accepted by a vote of 95-0. Those votes, however, are "history", and the Senate is now

⁶ Arms Control Today, 'Senate Rejects Comprehensive Test Ban Treaty; Clinton Vows to Continue Moratorium', September/October 1999, <http://www.armscontrol.org/act/1999_09-10/ctbso99> [Accessed 6 November 2010].

considering the treaty known as New START. This treaty,⁷ between the United States and Russia, calls for a modest decrease in the numbers of strategic, or long-range, nuclear weapons both countries possess. The treaty details how both countries will declare the number of weapons held and describes how each country will inspect the other's nuclear facilities to ensure agreed-upon reductions.

The debate over this treaty has been anything but modest. As noted in the *Washington Post* in August:

Last month, at an Armed Services hearing, [Senator] Inhofe [a Republican] questioned the number of hearings being held and the failure to call opponents of the pact. As an example, Inhofe noted that the Senate Foreign Relations Committee, of which he is a member, had held 12 hearings and heard 25 witnesses but that only two had voiced criticism of the treaty. He and other Republicans requested that [Senator] Levin (the Chairman) hold additional Armed Services hearings to give opponents a chance to testify. Armed Services has now had eight hearings on New START.

Eight years ago, it was different. In the months after the Moscow Treaty was signed, the Foreign Relations Committee held only four hearings and Armed Services just two. Two nongovernmental witnesses testified and noted that the pact had no verification procedures, though neither opposed its passage. Neither Inhofe nor any other Republican requested additional hearings or witnesses.

In fact, at the second and last of the Armed Services hearings in 2002, Inhofe said he was "going to be very quick" with only one question to ask. Why? Because, he said, "we have had so many of these hearings, I have run out of questions."⁸

This quote shows the contrast between a treaty put before a Republican-controlled Senate by a Republican president and a treaty put before a Democratic-controlled Senate by a Democratic president. As noted, both parties have long supported arms control, and many of the twenty-three witnesses that spoke in favour of the treaty had served in Republican administrations. But now the current political environment is so caustic that the opposition party will do nearly anything to oppose the president's agenda in foreign policy—an arena that has traditionally enjoyed bipartisan consensus, and where presidents have usually been given large leeway when consensus did not exist. Some Senators, such as the previously quoted Senator Inhofe, indicated their opposition to the START treaty even before the ink of the president's signature was dry. Others, such as Tennessee's Bob Corker, have named the price of their votes: Corker mentioned, after a visit to some of the US national labs, that he felt the

⁷ The formal title of this treaty is the "Treaty Between the United States of America and the Russian Federation on Measures for the Further Reduction and Limitation of Strategic Offensive Arms" and was signed on 8 April 2010.

⁸ Walter Pincus, 'New START: A Similar Arms Reduction Pact but a Different Republican Reaction', *Washington Post*, 10 August 2010.

facilities in his state required an additional US\$5 billion—beyond the already significant increase President Obama proposed for the US nuclear weapons complex.⁹ However, Senator Corker joined fellow Republicans Richard Lugar and Johnny Isakson and all of the Senate Foreign Relations Committee’s Democrats in voting to have the entire Senate consider the treaty.¹⁰ The Senate did not consider the treaty before the elections in early November. It remains unclear if the Senate will do so during a “lame duck” session between the election and a new Congress in January or if it will be forced to wait until the new Senate is seated. The new Senate will be more heavily Republican than the current one, which—given the partisan nature of treaty ratification discussions to date—would tend to make securing the Senate’s consent to ratification even tougher.

Thus, a president firmly committed to a path to zero, finds himself stymied by the Senate over a modest arms control treaty. The next treaty to be considered by the Senate will likely be the Comprehensive Test Ban Treaty, which will be a much greater challenge.

The House of Representatives can also play an important role in arms control and nuclear weapons. Senators serve for six years at a time. Representatives serve for two. This means that the body is quite different than the Senate in political tone. Another difference is that the Senate operates under a rule known as unanimous consent. This means that a single Senator can block anything. In the House, however, the majority has absolute control. The roles of the House—and its majority rules—are several. The first role is in treaty ratification. Any treaty that binds private parties in the United States or that requires expenditure of government resources must be implemented by legislation that, unlike consent to the Treaty’s ratification, must pass both Houses of Congress. This requires the House and Senate be in complete agreement regarding the implementation language. This language can include funding requirements, policy restrictions, and instructions to the President, as long as they do not attempt to supersede the language of the negotiated treaty or infringe upon executive powers granted by the Constitution exclusively to the President. The House can also pass non-binding legislation known as a “Sense of the House” that gives it the chance to send messages to the Senate, the President and others.

A second role for the House of Representatives is in nonproliferation, for which the House is just as important as the Senate. Indeed, the debate of the US/India nuclear cooperation agreement was much more involved in the House than it was in the Senate. The third is through the annual

⁹ Frank Munger, ‘Corker Estimates Higher Cost Range for New Uranium Facility at Y-12’, *Knoxville News Sentinel*, 26 July 2010.

¹⁰ Mary Beth Sheridan, ‘New Nuclear Arms Treaty with Russia Passes Senate Panel’, *Washington Post*, 16 September 2010.

authorisation and appropriations cycles through which policies are written and budgets are passed. But again, why is the House extremely important? Because the House, when controlled by the same party as the president—especially when the approval ratings of Congress are lower than those of the President— is much more likely to support the president's agenda than is the Senate, if there is popular support for it.

Is there current popular support for the President's agenda? Many editorials were written after the president's Prague speech. Many more editorials and opinion pieces have been written about the START and the CTBT treaties. However, a poll conducted in August 2010¹¹ showed that most Americans think a nuclear weapon arsenal is critical to the country's safety, and they feel more is better.

This survey found that 77 percent believe the US nuclear weapon arsenal is at least somewhat important to the country's national security, including 51 percent who say it is Very Important. 57 percent also say the United States should not reduce the number of nuclear weapons in its arsenal. But 55 percent of Americans think it is unlikely that other countries will reduce their nuclear weapons arsenals and development if the United States does so. Only 37 percent think other countries are likely to follow America's example. Forty-six percent of Americans, in fact, believe the United States should continue developing new nuclear weapons compared with thirty-one percent who think the country should halt development of new nuclear weapons.

Some in the arms control community have dismissed these numbers, suggesting that the questions implied that the United States would disarm unilaterally. While this may be true, these numbers are only slightly lower than they were in April 2010. The popular support for the president's vision is not quite where he needs it to be—and certainly not enough for the House to force through what parts of the agenda it could. The 2010 elections have led to a House that is less focused on arms control; the emphasis on debt and deficit reduction will likely collide head-on with the expense of maintaining a robust nuclear defence.

The United States is well known for having three separate branches of government, the legislative, executive, and judicial branches. As anyone who has served in government knows, there is a fourth branch: the bureaucracy. It often seems that the purpose of the bureaucracy is to outlast the current political leadership and survive to the next election. The US Department of Defense has many employees who came of age during the Cold War and are, in many ways, still fighting it, at least when discussing nuclear weapons. However, this Administration has made significant

¹¹ 'Toplines Nuclear Weapons II, August 8-9, 2010', Rasmussen Reports, <http://www.rasmussenreports.com/public_content/politics/toplines/national_survey_toplines/august_2010/toplines_nuclear_weapons_ii_august_8_9_2010> [Accessed 6 November 2010].

attempts to ensure that its goals are reflected in the documents it produces. When the Obama Administration was writing the *Nuclear Posture Review (NPR)*, the Pentagon held a series of off-the-record roundtable discussions with non-governmental experts with a variety of backgrounds, political ideologies, and views of nuclear weapons. These were good discussions and were reported to senior Pentagon officials. But in the end, the *NPR* was written by people who have been working on these issues for years. The result is an *NPR* that takes many good and important steps in changing the way the United States thinks about nuclear weapons, but one that is not as revolutionary as it might have been, given the president's stated goals.

The US Department of State has also not always served the president as well as it could. Secretary of State Hillary Clinton, Undersecretary Ellen Tauscher, and Assistant Secretary Rose Gottemoeller are gifted people who are all strongly supportive of the president's agenda. However, some of the people who report to them—the bureaucrats that enable the State Department to function—were hired during previous administrations, and some are political appointees from the Bush Administration that managed to find permanent jobs within the Department. These officials are at best indifferent to this president's agenda. And regardless of ideology, the State Department has significant problems with finding staff with the necessary skill set. As an example, the Arms Control and Disarmament Agency was created in 1961 as an independent agency in order “to strengthen the national security of the United States by formulating, advocating, negotiating, implementing and verifying effective arms control, nonproliferation, and disarmament policies, strategies, and agreements.”¹² The staff of the agency included many very smart, savvy physical scientists—people who played critical roles in making sure that the arms control treaties the United States signed were useful, verifiable, and did not hinder US goals. However, when ACDA was integrated with the State Department in 1999, many of the staff with technical expertise left the agency. Another reorganisation of the State Department during the Bush Administration resulted in even more of the expert staff leaving. The United States now finds itself negotiating arms control treaties with only the barest handful of staff with technical expertise in the State Department. This is not a recipe for success, and it may take a generation or more to rebuild that important cadre of people.

From this author's perspective, the United States has a president who wants to carefully eliminate nuclear weapons, a Senate that does not seem to be able to move in that direction, a House of Representatives that doesn't currently see a clear motivation to support the objective, and a bureaucracy that may not always serve the president in the most effective way. And naturally, if Iran or other countries leave the Nuclear Nonproliferation Treaty

¹² ACDA Mission Statement, accessed in an on-line archive at US Arms Control and Disarmament Agency home page, <<http://dosfan.lib.uic.edu/acda/>> [Accessed 6 November 2010].

regime and build nuclear weapons, the chances of any further decreases in the size of the US nuclear arsenal will diminish significantly, no matter how much the President may desire it and devote his own energies to that end.

The Technical Context

While these political constraints towards ever reaching nuclear disarmament are severe, they are not the only such constraints. In addition to requiring political will, successfully reducing the global number of nuclear weapons also requires the scientific and technical expertise to ensure that weapons are dismantled, fissile materials are repurposed, and no additional weapons grade uranium or plutonium is produced.

There is no question that the United States has the technical capability to dismantle its nuclear arsenal and the associated delivery vehicles. But making a political decision that such an action would be appropriate and safe will take considerable time, and, as the survey results mentioned above indicate, the US electorate is not ready to see this happen unilaterally. And it is quite clear that while having the United States eliminate its own nuclear weapons would eliminate a large fraction of the world's nuclear weapons, it would not cause the rest of the nuclear weapons states to give up their arsenals, nor would it necessarily convince non-nuclear weapons states that they did not need nuclear weapons of their own. Indeed, one obstacle to US elimination often highlighted by opponents of such an action is that should the United States make serious progress towards eliminating its nuclear arsenal, allies who are currently under its "nuclear umbrella" may lose confidence in the ability of the United States to deter a nuclear attack against them, and as a result, they may seek to develop their own nuclear stockpiles.

Since no nuclear power is likely to eliminate its arsenal without some assurance that others are doing the same, successfully ridding the world of nuclear weapons will require development of capabilities to verifiably downsize and dismantle the existing nuclear weapons, accurately account for all of the weapons grade materials currently in existence, and to prevent the unnecessary and unmonitored spread of technology that could be used to produce weapons grade fissile material. To complicate things ever so slightly, this must be done in an environment with a dramatic increase in the amount of electricity generated by nuclear power and a corresponding increase in the amount of uranium enrichment and spent fuel reprocessing capacity.¹³

None of these challenges will be easy to solve, and some of them are not particularly glamorous areas of research and development. Some of them,

¹³ Jay Davis, et al., *Technical Steps to Support Nuclear Arsenal Downsizing* (Washington DC: American Physical Society, 2010).

such as the tags and seals needed to safeguard materials, are decidedly unsexy. But some very clever people in the United States and elsewhere are doing very clever things to make it possible to take the necessary technical steps.

In the past, US-Russian arms control treaties have required the destruction of launch facilities and submarines, i.e. the delivery systems, not the nuclear explosive devices, or warheads, themselves. As both countries move to smaller arsenals, it is clear that weapons dismantlement must at some point be included as part of the formal treaty process. This is more complicated—detecting the destruction of missile silos can be done remotely, but dismantlement of warheads is much harder, if not impossible, to detect at any distance. Future treaties will thus require more intrusive inspection measures to document treaty compliance. To complicate things further, these intrusive inspection measures must be undertaken in such a fashion that parties can verify that weapons went into a facility and components came out, but without releasing classified design information about these weapons. Information barriers are clearly key to this work—and will become even more so as additional countries become involved in the treaty process, either as observers of the dismantlement process or as dismantlers of their own weapons. The tags and seals mentioned earlier are important to ensure, in part, that the dismantled parts stay dismantled and are further broken down into component parts and the fissile materials down-blended into reactor-grade fissile material, from weapons-grade fissile material. As part of this effort, one or more international centres for verification research and validation should be established to serve as test sites for assessing technologies and methodologies. Prime examples of the type of work such a Centre might do are the work that the United Kingdom and Norway undertook with their verification experiment, and the newly established US\$50 million centre for verification studies at the Nevada National Security Site.¹⁴ These centres, in addition to working on technology, would also serve as locations where confidence-building measures can be undertaken by both nuclear weapons states and non-nuclear weapons states. These confidence-building measures are critical, because the United Kingdom, France, and China are unlikely to further reduce the sizes of their respective arsenals without being firmly convinced that the United States and Russia are truly downsizing their arsenals. At some later point, the non-nuclear weapons states will need to be assured that the nuclear weapons states are all upholding their disarmament obligations under Article IV of the NPT. While it will likely take decades to eliminate all existing nuclear weapons, developing and implementing confidence building measures in the near-term is one way to expedite the process.

Once weapons have been dismantled, it is critical to ensure that the existing weapons-grade materials are down-blended and used as reactor fuel, or

¹⁴ The Nevada Test Site was renamed the Nevada National Security Site in August 2010.

irretrievably disposed of, instead of retained for reuse as weapons materials. Again, tags and seals are important. Research into tamper-indicating wireless tags and seals is under way at several of the US national labs and at international facilities such as the Joint Research Center in Ispra, Italy. Similar efforts are required to improve the capabilities of the International Atomic Energy Agency and other organisations to detect the construction and operation of covert enrichment and reprocessing facilities and to monitor known facilities in order to prevent the clandestine diversion of materials to produce weapons-usable uranium or plutonium.

To support the goal of ensuring peaceful uses of fissile material, sustained US Government investments are required in key programs including those to strengthen safeguards, detect undeclared nuclear facilities, and address potential risks associated with global growth of nuclear expertise. In particular, this will require a greater emphasis on non-proliferation in the US Nuclear Regulatory Commission (NRC) licensing process, and establishing a program of information sharing among nuclear-related industries. The NRC will need to ensure that advances in reprocessing and enrichment technologies are not proliferation risks, and will need to ensure that technology is appropriately safeguarded. The industries that produce and supply the components used to reprocess and enrich—vacuum chambers, certain types of steel, and potentially, certain types of high powered lasers—as well as the dual-use technologies—high speed switches, certain types of high explosives—that could be used to build nuclear weapons will need to find ways to share information among themselves to ensure that the technologies are not in the hands of those who should not have them.

Another challenge for nuclear weapon states seeking to maintain their stockpiles until they can be safely phased out is to sustain the capability and expertise to recognise what a healthy nuclear weapons program looks like. To do that, the elements of the US nuclear weapons infrastructure needed to sustain a smaller nuclear weapons stockpile will require ongoing refurbishment. This remains the case even as the stockpiles draw down to zero. Further, NNSA and its laboratories must adapt for the broader nuclear security mission that stockpile reduction will bring and for the range of additional, non-nuclear security roles that they will be asked to play.

Summary

The US Government is far from united in supporting the president's goal of eliminating nuclear weapons in the near- to mid-term. The politically chaotic situation currently evident in the United States makes it highly unlikely that this will change any time soon—and it certainly does not seem as though the American electorate supports the president's vision right now. Second, as the United States and Russia move to lower and lower numbers of nuclear weapons, verifying the sizes of arsenals, the dismantlement of weapons and delivery systems, and documenting the true quantities of fissile materials

available will become increasingly important and increasingly difficult. The United States is moving in the right direction here, but many technical experts are not yet sure that the verification of zero (or numbers close to zero) is possible without significant changes in how and when inspections are done.

In many ways, the objective of Global Zero is like string theory: both are interesting but have no direct relevance to the present world right now because of the significant amount of yet-to-be-completed work. But both have captured the attention of some of the brightest and most capable people on the planet, and it is only through their hard work, dedication, and leadership that any progress will be made on either front.

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