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Abstract

In preparation for the Nuclear Non-Proliferation Treaty (NPT) review conference next year, the United States reports great progress in physically dismantling its nuclear weapons—a foundation for a key pillar of the treaty, which aims, ultimately, to reduce and eventually eliminate the arsenals of the world's nuclear powers. The US Government Accountability Office (GAO), however, presents a very different picture. The US government's statements about nuclear weapons dismantlement "may be misleading," the GAO concluded in a 2014 report, finding that the National Nuclear Security Administration (NNSA), which oversees dismantlement within the Energy Department, "does not track the actual date that dismantled weapons were retired" and "will not dismantle some weapons retired prior to fiscal year 2009, but will reinstate them," causing the US nuclear stockpile to grow. Moreover, the Obama administration seeks to cut dismantlement funding and plans to halt dismantlement altogether after 2022, until new and costly nuclear warhead production facilities are established, tentatively in the early 2030s. Until nuclear dismantlement policies are reformed, disposal of unneeded nuclear weapons and their components will continue to be an afterthought, with huge costs looming in the future. Without reform, dismantlement will remain a mismanaged process kept in the shadows, except when it is burnished for display at NPT review conferences.

Keywords

canned subassembly, NNSA, NPT, Nuclear Weapons Council, nuclear weapons dismantlement, Pantex, Y-12

In preparation for the Nuclear Non-Proliferation Treaty (NPT) review conference next year, the United States reported on April 29 that great progress is being made in physically dismantling its nuclear weapons—the foundation for a key pillar of the treaty which aims, ultimately, to reduce and eventually eliminate the arsenals of the world's nuclear powers. Indeed, nearly 90 percent of the 66,500 warheads made since World War II have been dismantled. In the aftermath of the Cold War, between 1994 and 2013, the United States and Russia eliminated nearly 10,000 warheads. Furthermore, the United States has committed to dismantling all of the nuclear weapons retired from its nuclear stockpile before 2009. This level of dismantlement is projected to be achieved by 2022 (see US Department of State, 2014).

The next day, however, the US Government Accountability Office (GAO) presented a very different picture of the

US weapons dismantlement program to the US Senate Energy and Water Appropriations Committee (GAO, 2014). The US government's statements about nuclear weapons dismantlement "may be misleading," the GAO (2014: 23) concluded, finding that the National Nuclear Security Administration (NNSA), which oversees dismantlement within the Energy Department, "does not track the actual date that dismantled weapons were retired" (GAO, 2014: prelims). Also, the GAO found, the NNSA "will not dismantle some weapons retired prior to fiscal year 2009, but will instead reinstate them to the stockpile" (GAO, 2014: prelims).

Perhaps most troublesome for the upcoming NPT review conference, the GAO report noted that the Obama administration plans to refrain from dismantling weapons taken out of the active military forces under the arms control agreement known as New START until there is a "successful restoration of the NNSA weapons production infrastructure" (GAO, 2014: 29). That restoration, it has been estimated, will cost tens of billions of dollars, and the schedule for completion of the program has now slipped into the early 2030s. In effect, the dismantlement of old nuclear weapons is being held hostage until the United States can establish several new and enormously costly facilities to make potentially large numbers of new nuclear weapons well into the 21st century and beyond—even though it is unclear how many new or refurbished nuclear weapons will actually be needed.

Whether the non-nuclear signatories of the NPT will see this US plan as progress toward the disarmament that nuclear nations promise under the treaty is, to say the least, an open question.

Why it takes so long to dismantle a nuclear weapon

Research by Robert Norris and Hans Kristensen of the Federation of American Scientists shows that as of September 2013 the United States was estimated to possess approximately 7,700 intact nuclear warheads, of which about 3,000 retired weapons had been released for dismantlement by 2022 (Kristensen and Norris, 2013). The Obama administration, however, has demonstrated a decided lack of enthusiasm for eliminating nuclear weapons, seeking to cut annual spending for weapons dismantlement in fiscal 2015 by 45 percent. According to the Los Alamos Study Group (LASG), a New Mexico-based advocacy nonprofit, this funding reduction "is expected to produce dismantlement workload reduction of 40 percent, which could set a historic low…" (LASG, 2014: 3). George W. Bush unilaterally retired 5,253 weapons, or 42 percent of the US nuclear arsenal, during his presidency. President Obama has thus far removed about 500 warheads from active status (Kristensen, 2013).

The US system for dismantling unneeded nuclear weapons is guided by a labyrinthine bureaucratic process presided over by the Nuclear Weapons Council, a five-member panel of Defense Department and Energy Department officials convened by the president. In its dismantlement report, the GAO showed that the system for managing nuclear weapons is highly complex and full of loopholes, making it difficult if not impossible for anyone outside of this isolated nuclear weapons bureaucracy to fathom.

That bureaucracy characterizes the nuclear arsenal as having active and inactive warheads; within each of those

categories, weapons are seen as being in one of 10 states of readiness. The highest readiness state involves weapons that are operationally deployed and are within the limits of nuclear arms control treaties. About 2,150 weapons are estimated to be deployed, with about 2,500 active "spares" maintained by the Defense and Energy departments at storage depots in an inoperable status. Known as "hedge" weapons, inactive warheads are maintained in case active warheads fail or there is a significant change in the geopolitical situation—such as a belligerent Russian "breakout" from disarmament treaties that was envisioned during the Cold War.

Once a weapon is retired, it can either be formally released for dismantlement or kept in a form of "managed retirement"; weapons on managed retirement can be kept in the active or inactive stockpile for years. Weapons in managed retirement can be reactivated for the reasons outlined above. The GAO found that about 9 percent, or roughly 300 to 450 warheads, retired prior to 2009 are scheduled to be reinstated to the active stockpile, causing it to grow. The NNSA says these reinstatements are to save money and to compensate for weapons taken from the active stockpile for maintenance and surveillance. Accurate accounting of the status of weapons leaves much to be desired, however; the NNSA lacks a system to track warhead retirement dates, even though grocery stores are able to use such systems to track the shelf life of food.

Further complicating the process for dismantling weapons, the NNSA has failed to properly maintain its system for assessing and evaluating each nuclear weapon for reliability, aging problems, and safe dismantlement. Known as configuration management (CM), this system is a fundamental element in the control of the nuclear stockpile and is based on careful documentation of "as built" drawings and product definitions made during the design, manufacture, assembly, and deployment of a nuclear weapon.

While serving in the Energy Department in 1995, my staff reported the CM problem to responsible officials, as we were establishing an effort to recover precious metals from dismantled weapons. It was only after several more allegations about problems with configuration management that the Energy Department inspector general reported, in March 2014, that "over the decades of nuclear weapons development, neither NNSA nor its sites treated the maintenance of original nuclear weapons CM information as a priority" (Energy Department, 2014a: 4). At the Pantex Plant in Texas, officials could not find 59 percent of the "as-built" drawings that document all changes made to active weapons selected for dismantlement (Energy Department, 2014a).

Dismantlement teams are highly dependent on precise documentation of how the weapons are constructed. Without those drawings, during dismantlement the teams could encounter undocumented changes that pose unforeseen dangers. Over the past few years, the complexity of nuclear weapons has led to growing safety concerns and prompted an end to the long-held practice of concurrently dismantling multiple warhead types in the same location.[1]

Neglect has also led various facilities in the nuclear weapons complex to hoard spare non-nuclear parts of nuclear warheads, many of which are decades old

and will never again be needed. The GAO reports that at the Pantex Plant and the Kansas City Plant in Missouri 1.7 million spare parts for nuclear weapons have been stored for 25 years or more. "We observed several components covered in dust that appeared not to have been touched or moved in years, if not decades," the GAO said (GAO, 2014: 46). Nearly half a million of those parts are from weapons no longer in the active stockpile, including some weapons built more than 50 years ago.

Meanwhile, the GAO reports, unless the NNSA extends its 2022 dismantlement goal there could be a disruption in the continuity of the dismantlement program, delaying the retirement of weapons removed from the nuclear arsenal after 2009. This disruption would take the form of a hiatus in dismantlement work—between 2022, when work on pre-2009 warheads would be complete, and some uncertain time in the future, perhaps the early 2030s, when the weapons complex infrastructure would be deemed sufficiently refurbished to again support weapons dismantlement. Such a break in the dismantlement program would mean the significant loss of certified technicians, who require intensive training. By the time new weapons facilities are established, most of the trained workforce required for dismantlement will likely have disappeared.

The lull in dismantlement could also lead to further deterioration of facilities and increase the large backlog of weapons complex maintenance and repair already awaiting completion. Currently, for every dollar spent at Pantex to carry out its mission, an additional dollar is spent "to provide the underlying infrastructure" (Energy Department, 2014b: 201). Even this level of spending is proving to not be enough. For instance, the Energy Department inspector general reported in January 2013 that "the infrastructure for staging nuclear materials at Pantex continues to age without needed improvements" (Energy Department, 2013: 2). The Pantex contractor also informed the inspector general's office that "erosion will be a perpetual issue for the magazines [the plutonium pit storage 'igloos'] until corrective actions are taken" (Energy Department, 2013: 3).

What does dismantlement entail?

Nuclear weapons dismantlement requires the separation and storage or disposal of the component parts of the weapons. The primary dismantlement work for the US arsenal is done at the Pantex Plant, where casings, electronic components, and high explosives are removed from fissile plutonium cores. Since 1975, Pantex has been the only Energy Department center for weapons assembly, disassembly, retrofit, and modification.

Dismantlement of nuclear weapons is a complex endeavor involving the handling of high explosives and large amounts of fissile materials in a variety of specially designed environments known variously as bays, cells, special purpose facilities, and storage facilities. Partial dismantlement takes place in thick-walled nuclear explosive bays, where electrical components, tritium "bottles" used to boost fission explosions, and high explosives—the key components that ignite a nuclear weapon—are removed.

Removal of the "physics package" of a thermonuclear weapon—including the plutonium core, or pit, and the canned subassembly (CSA) that fuels the thermonuclear explosion—happens in "cells" of mounded earth and gravel

with thick, hardened concrete covers. Once a pit is removed, it is carefully moved for temporary storage in concrete magazines known as "igloos."

CSAs contain highly enriched uranium (HEU), lithium deuteride, and other materials that constitute the "secondary" charge of a modern nuclear weapon. They are sent to the Y-12 nuclear site in Oak Ridge, Tennessee, where some are dismantled to recover the HEU and other materials. But thousands remain intact. About 5,000 canned subassemblies containing roughly 125 metric tons of HEU are estimated to be stored at Y-12 (Kristensen, 2013).

Non-nuclear components that may be needed for reuse are sent to the NNSA's Kansas City Plant in Missouri. Other unneeded parts are "sanitized" into unrecognizable forms and sent for disposal at the NNSA's waste disposal landfill at the Nevada National Security Site.

Electronic and other weapons components can contain substantial amounts of precious metals. In the 1990s, the value of precious metals in dismantled weapons was estimated by the Energy Department's inspector general at about $60 million in 2014 dollars (Energy Department, 1995).

The Pantex Plant has an authorized temporary capacity for storing 20,000 plutonium pits. Pantex now holds more than 14,000 pits from dismantled warheads in concrete igloos; the pits contain more than 56 metric tons of plutonium.

Of the plutonium stored at Pantex, some 38.2 metric tons was declared in 1994 to be no longer needed for national security. Although the Energy Department initiated an effort in 1997 to dispose of this plutonium by mixing it with uranium to create a mixed oxide fuel (or MOX) for use in commercial power reactors, this program has lost support because of soaring costs now estimated at more than $30 billion. The Energy Department is looking at other options for disposing of this plutonium, which will further delay the removal of excess plutonium pits from Pantex. The GAO says that Pantex has enough capacity to store plutonium components from weapons dismantled by 2022. After that, there's expected to be a plutonium storage crunch, requiring possible construction of an additional "igloo" or the use of other facilities such as the Device Assembly Facility at the Nevada National Security Site to store this massive amount of plutonium.

As for the thousands of intact CSAs stored at Y-12, the NNSA appears to minimize the need for dismantlement. The GAO concludes that even though the NNSA's decision to retain many CSAs poses significant challenges to Y-12's ability to deal with them, the agency is "driven by national security considerations and not by Y-12 workload considerations" (GAO, 2014: 43). As I have written (Alvarez, 2014), the justification for holding on to intact CSAs stretches the boundary of imagination and includes "potential use in planetary defense against earthbound asteroids."

The need for a realistic dismantlement plan

Implicit but unacknowledged in the decisions to "slow-walk" dismantlement of retired US nuclear weapons is an elemental truth: The elimination of nuclear weapons is expensive and competes directly with programs that aim to maintain an oversized US nuclear arsenal and the associated, very costly efforts to restore an antiquated nuclear weapons

production infrastructure. Accelerating dismantlement for weapons retired before 2009 could, according to the NNSA, cost $212 million (GAO, 2014).

By delaying dismantlement and refusing to put forward concrete plans for dealing with the downsizing of its nuclear arsenal, the United States is setting itself up for financial pain, in the form of a nuclear legacy "balloon" payment that subsequent generations will have to pay. Refusing to deal with dismantlement now only means that the government will pay exorbitantly for storing retired weapons and their components over time—until it pays for their ultimate elimination, anyway.

This dynamic—which has taxpayers pay huge sums for improperly overseen storage of idle nuclear weapons and unneeded components and slows the rate at which retired weapons are disassembled—will change only when the elimination of nuclear weapons becomes a true programmatic function of the US government, considered as part and parcel of the nation's defense costs. Until then, the disorganized, wasteful, and achingly slow US system for disposing of unneeded nuclear weapons and their components will continue to be an afterthought, a process kept in the shadows except when it is shined up and trotted into public view, just in time to show the US non-proliferation flag at NPT review conferences.

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Note

1. Lightning strikes, common in the vicinity of the Pantex site, pose a remote but potentially very serious threat to ignite a weapon or its components. On occasion, dismantlement and assembly are halted during lightning storms.

References

Alvarez R (2014) Y-12: Poster child for a dysfunctional nuclear weapons complex. *Bulletin of the Atomic Scientists*, web edition, August 4. Available at: http://thebulletin.org/y-12-poster-child-dysfunctional-nuclear-weapons-complex7361.

Energy Department (1995) Audit of the Department of Energy's management of precious metals. Office of Inspector General Office of Audit Services. June 20. Available at: http://energy.gov/sites/prod/files/ig-0375.pdf.

Energy Department (2013) The National Nuclear Security Administration's weapons dismantlement and disposition program. Audit report, January. Available at: http://energy.gov/sites/prod/files/OAS-L-13-06.pdf.

Energy Department (2014a) National Nuclear Security Administration nuclear weapons systems configuration management. Audit report, March 26. Office of Inspector General. Available at: http://energy.gov/ig/downloads/audit-report-doeig-0902.

Energy Department (2014b) Department of Energy FY 2015 congressional budget request. National Nuclear Security Administration Nuclear Weapons Systems Configuration Management. March. Available at: http://energy.gov/sites/prod/files/2014/04/f14/Volume%201%20NNSA.pdf.

GAO (2014) Nuclear weapons: Actions needed by NNSA to clarify dismantlement performance goal. Report, April. Available at: http://www.gao.gov/assets/670/662840.pdf.

Kristensen HM (2013) (Still) secret US nuclear weapons stockpile reduced. FAS blog post. Available at: http://fas.org/blogs/security/2013/02/stockpilereduction/.

Kristensen HM and Norris RS (2013) Global nuclear weapons inventories, 1945–2013. *Bulletin of the Atomic Scientists* 69(5): 75–81.

LASG (2014) Dismantlement dissembling: US claims of nuclear weapons retirement, dismantlement "may be misleading" – GAO. Press release, May 1. Available at: http://www.lasg.org/press/2014/press_release_1May2014.pdf.

US Department of State (2014) Report of the United States of America Pursuant to Actions 5, 20, 21 of the 2010 Nuclear Non-Proliferation Treaty Review Conference Final Document. April 29. Available at: http://papersmart.unmeetings.org/media2/2927599/us-national-report-2014.pdf.

Author biography

A senior scholar at the Institute for Policy Studies, **Robert Alvarez** served as senior policy adviser to the Energy Department's secretary and deputy assistant secretary for national security and the environment from 1993 to 1999. During this tenure, he led teams in North Korea to establish control of nuclear weapons materials. He also coordinated the Energy Department's nuclear material strategic planning and established the department's first asset management program. Before joining the Energy Department, Alvarez served for five years as a senior investigator for the US Senate Committee on Governmental Affairs, chaired by Sen. John Glenn, and as one of the Senate's primary staff experts on the US nuclear weapons program. In 1975, Alvarez helped found and direct the Environmental Policy Institute, a respected national public interest organization. He also helped organize a successful lawsuit on behalf of the family of Karen Silkwood, a nuclear worker and active union member who was killed under mysterious circumstances in 1974. Alvarez has published articles in *Science*, the *Bulletin of the Atomic Scientists*, *Technology Review*, and *The Washington Post*. He has been featured on television programs such as *NOVA* and *60 Minutes*.