

Transparency Workshop: Nuclear Weapons and Fissile Material
Discussion Paper

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February 7, 2017

“But the truth is that there are secrets worth protecting: to protect national security, to engage in effective diplomacy, to fight terrorism and to stop the proliferation of weapons of mass destruction.” John D. Podesta, (Prepared Remarks For 4th Annual Intelligence Community Information And Classification Management Conference, November 3, 1998)

Precisely because nuclear weapons long have been viewed as the ultimate weapon, countries that have them and those that have tried to obtain them have cultivated secrecy about their programs. While such secrecy has been used to preserve qualitative and/or quantitative advantages in offensive or defensive capabilities, in some cases it has also served the exact opposite purpose—to hide vulnerabilities or inferior capabilities. One could also argue it has been used to dodge accountability, both to domestic and international audiences.

Of course, national interests have been served by announcing or releasing information. For example, U.S. President Truman announced both his intention to develop the hydrogen bomb (in January 1950) and its successful test (in January 1953, two months after the Ivy Mike explosion). And some activities-- for example-- missile or nuclear tests, cannot so easily be hidden. In other cases, what may pass for transparency – for example, North Korea’s claims of a thermonuclear capability – may actually be disinformation.

Within this overall landscape of secrecy, the body of publicly available information about nuclear weapons arsenals and fissile material stockpiles has grown, in no small part because of the efforts of experts outside government. They have used a variety of information sources to make their estimates, including arms control agreements (like INF, START and New START), budget data, environmental data, unilateral government statements, declassified documents (primarily in the United States and United Kingdom), leaks of classified information, defector statements, and remote monitoring technology, to name a few. At this point, it would be useful to take stock of those expert assessments and consider how best to move forward.

This workshop is one element in a broader project funded by the MacArthur Foundation that is aimed at reducing the risks of fissile material. The project seeks to build norms where legally binding limits are elusive: transparency regarding fissile material, reducing civil plutonium stockpiles and limiting naval fuel to low-enriched uranium.

The first step in our project’s effort on transparency is to take stock of what we know and how we know it. We will cover both nuclear weapons and fissile material for a few reasons: estimates of each inform the other, particularly in states with smaller nuclear stockpiles, the major transparency initiatives include both, and verification of both is necessary ultimately in the nuclear disarmament process.

The first half of the workshop is designed to facilitate an exchange of views and experience on the quality and availability of data, as well as generate a “wish list” of sources. The appendix to this short paper gives a “Cliff-Notes” version of how countries have handled transparency. The rest of this paper will provide some background for the workshop’s discussion on transparency measures.

The second half of the workshop will focus on opportunities and challenges in promoting a norm of transparency regarding fissile material and nuclear weapon stockpiles. We will use the matrix of standardized reporting for nuclear weapon states recommended by states grouped into the Nonproliferation and Disarmament Initiative (NPDI), as well as the transparency matrix published by the International Panel on Fissile Material (IPFM) in this area. Part of the challenge in this workshop will be to expand our focus beyond the five NPT nuclear weapon states to consider what might be possible in the future for the other four nuclear weapon states.

Finally, we will explore, with the help of John Mecklin, new approaches for promoting dissemination of estimates and transparency recommendations.

Background

Nuclear weapon states, whether inside or outside the NPT, have no legal obligation to provide information about their civilian nuclear programs, their civilian or military stockpiles of fissile material or their nuclear weapon programs.¹ All of these states, (with the possible exception of Israel and North Korea) have indulged in significant co-mingling of civilian and military programs. This comingling could potentially complicate future verification of nuclear disarmament measures.

And yet, progress in transparency on both nuclear weapons and fissile material in the last two decades suggests there is potential for building a norm of transparency absent legally binding obligations.² And certainly, expectations of transparency have grown. Those arguing for improved transparency believe that information builds trust, that better reporting by nuclear weapon states can strengthen accountability under the NPT, and that nuclear security is strengthened by better accountability. Close to fifty years after the NPT entered into force, non-nuclear weapon states need something from nuclear weapon states to show a commitment to disarmament and an acknowledgement that accountability is necessary. But in addition, transparency is a *sine qua non* for verification and irreversibility, two indispensable principles in nuclear disarmament.

Obviously, some argue against transparency for reasons of national security and nonproliferation, and there are also experts who argue that transparency may have run its course and should not be accepted in lieu of verified reductions in nuclear weapons or in fissile material stockpiles. In other words, while transparency is a prerequisite in the disarmament process, it should not be a “consolation prize” in the absence of real verification.

¹India, Pakistan, and Israel do provide information about nuclear material and facilities they have placed under facility-specific IAEA safeguards as a result of supplier requirements.

² Here, transparency is used to mean the provision of information previously not released to the public.

Obviously, the value of transparency measures depends a great deal upon what the measures are and what they accomplish. With respect to nuclear weapons, do they pertain to intentions (e.g., strategy, doctrine)? Historical production or stockpile numbers? Qualitative achievements? Can the information be confirmed or verified? While the release of information about past activities (production histories, stockpiles, etc.) is helpful, it is quite different from the release of information about current activities. Are the measures aimed more at building trust or improving accountability?

With respect to fissile material, there is a dual challenge because civilian fissile material is also largely outside the bounds of accountability for several of these states. Pending a fissile material treaty, NPT nuclear weapon states may find it easier to provide more information or even place material and/or facilities under international monitoring, because they have stopped production for weapons purposes. This is not the case for India, Pakistan, and North Korea, which are still producing fissile material for nuclear weapons. The value there of transparency measures is clear, but so are the obstacles. On the civilian side, there have been modest attempts at transparency (e.g., INFCIRC/549, Plutonium Management Guidelines) that frankly pale in comparison to the information and access that non-nuclear weapon states parties to the NPT provide via IAEA safeguards to assure others they are not diverting material to nuclear weapons programs.

Challenges and Opportunities for Transparency

One of the key criticisms of transparency measures is that they are by nature unverified. In the absence of verification measures, a critical function of civil society work in this area is to assess the credibility of government statements. This is more difficult in countries that do not have a culture of transparency, where there is generally less authoritative information available. In the case of the United States, scholars early on used environmental data on the concentration of Krypton-85 in the atmosphere to calculate plutonium production before the government released actual numbers. This analysis required assessing all the potential releases of Kr-85 over decades to extrapolate what U.S. and Soviet plutonium production might have contributed to such concentrations. Another approach is to cross-check numbers, using stockpile numbers to calculate fissile material production or vice versa.

Poor historical records can limit the credibility of government statements. For example, the lack of historical production records has hampered confirmation of fissile material holdings. In the process of making fissile material declarations, the United Kingdom, the United States, and South Africa all found inaccuracies in their purported holdings; specifically in the UK case, it lacks records to fully confirm the extent of shipments made to the United States.³ Further, drawdowns and processing losses can be difficult to accurately measure but can quickly amount to larger quantities of material in states with larger production capacities—a challenge for future verification of disarmament.

³ In its June 2012 update to its history of U.S. plutonium production and holdings, the Department of Energy noted that “there remain uncertainties about how much plutonium was actually produced, processed, and discarded to waste, especially for the period from the mid-1940s to 1970 before advances in nuclear material measurement systems and computer aided tools to assist in the analysis of nuclear material accounting data.” *The United States Plutonium Balance, 1944-2009*, p.3.

This raises an important question about the limitations of transparency measures in meeting their policy objectives. Transparency measures meant to improve accountability or function as an interim step toward verifiable limits could raise expectations for corroboration or verification, as opposed to those merely meant to build trust or confidence. However, the failure to meet those expectations might diminish the measures' ability to engender trust or confidence.

Looking Forward

Although nuclear weapon states have been urged to make declarations about their nuclear weapons programs within the NPT Review Conference process for close to two decades, non-nuclear weapon states have only recently pushed for standardized reporting. In the last five years, the NPDI has recommended that reports include the number and types of nuclear warheads, delivery vehicles, the number and type of warheads and delivery systems already dismantled, the amount of fissile material produced for military purposes, and the steps taken to reduce the role of nuclear weapons in military and security strategies. IPFM simplified the NPDI template (see Appendix II), recommending that nuclear weapon states declare the total number of nuclear weapons held, the amount of fissile material held at home and abroad, and whether any HEU or plutonium is available for monitoring. According to IPFM, such declarations, even if not verified, would demonstrate a commitment to disarmament and ensure that historical records are located and organized as soon as possible.

Japan has proposed, both in a working paper for the 2015 NPT Review Conference and in a working paper for the Open Ended Working Group (taking forward multilateral nuclear disarmament negotiations, established per resolution 70/33 of UNGA), that nuclear weapon states report annually on the following items:

- Number, types (strategic, non-strategic) and status (deployed, non-deployed) of nuclear warheads;
- Number and if possible, types of delivery vehicles;
- Number and types of weapons and delivery systems dismantled;
- Amount of fissile material produced for military purposes;
- Measures taken to diminish the role and significance of nuclear weapons in military and security concepts, doctrines and policies.

Note that at the OEWG meeting, Japan proposed that all nuclear weapon holders, not just the five NPT nuclear weapon states, report to the UN Secretary General on this information.

Also at the OEWG, the Grupo de Praticas em Direitos Humanos e Direito Internacional proposed similar reporting (but also including location of warheads and details relating to transit of nuclear weapons through their territory) for *non-nuclear weapon states* that have nuclear weapons on their territory. And Iran recommended the following transparency measures for nuclear weapon states:

- Regular updates about number, types, destructive power, status and location of all nuclear weapons, as well as number and type of delivery vehicles;
- Regular updates about plans, expenditures and number of facilities related to modernization of nuclear weapons, as well as the amount of their fissile material for military purposes;
- Release all information related to reducing risks of nuclear weapons;

- Conclude safeguards agreements with the IAEA to verify nuclear disarmament obligations.

In 2013, UNIDIR published a [report](#) by Tamara Patton, Pavel Podvig, and Phillip Schell that laid out the case for using New START as a template for transparency reporting. They argued that meetings of the P-5 since 2009, despite identification of transparency as a topic of discussion, made little progress (apart from the P-5 glossary of terms). Under their approach, the nuclear weapon states could initially declare aggregate numbers of deployed strategic delivery vehicles, deployed warheads, and the total number of deployed and non-deployed launches. Subsequent declarations could include more detailed information on deployed and non-deployed strategic systems; missile, submarine, and air bases; and other facilities—information that the United States and Russia exchange under New START. The use of an existing mechanism and reporting template for future transparency efforts would take advantage of existing definitions and protocols that have already been painstakingly negotiated.

Questions for Discussion

On Estimates:

- a. What are the strengths and weaknesses of civil society estimates?
- b. How do types of data vary across countries?
- c. Is it possible to improve the quality and availability of data? If so, how?
- d. Are there additional ways to reach the public with this information?

On Transparency Measures:

- a. Of the proposed categories of information recommended for nuclear weapon state reporting, which are the most important for building trust? For building accountability?
- b. How can existing mechanisms be used to best effect to continue reporting if interest in transparency drops off in key states?
- c. Should transparency be “graded”? If so, how?

APPENDIX I

Roots of Openness

It is impossible to ignore the positive impact of the end of the Cold War on transparency, but it is also important to place it in context. Between the 1940s and 1980s, information about nuclear arsenals and fissile material available in the public domain was limited and sporadic. The United States and Russia disclosed some details through arms control treaties, but the information was restricted largely to strategic warheads and delivery vehicles. In the United States, the Natural Resources Defense Council began to fill the gaps with its estimate of U.S. arsenal in 1984, adding a volume on Soviet weapons in 1988 and a volume about the French, British, and Chinese arsenals in 1994. Work at Princeton University by Hal Feiveson, Frank von Hippel, David Albright and others added significant estimates, particularly on fissile material production. The 1992 volume by David Albright, Frans Berkhout, and William Walker on global inventories of fissile material, which has been updated periodically, marked another important milestone.

The end of the Cold War, it can be argued, spurred significant transparency efforts in the US and UK, and more muted responses in France and Russia. The Clinton Administration launched a government-wide openness campaign in the mid-1990s, leading to significant declassification of information. The Department of Energy's Openness Initiative released the total amount of plutonium produced, number of nuclear weapon tests (including those unannounced), and plutonium inventories in December 1993 and followed with information on HEU a few years later.⁴

The United Kingdom was not quite as exuberant in its rush to declassify information, but declared in 1998 that it could safely make significant reductions from Cold War levels of nuclear forces and be more transparent. The 1998 Strategic Defence Review revealed fissile material holdings of 7.6 tons of defense plutonium and 21.9 tons of HEU. The UK at the same time declared some as excess, placing it under EURATOM safeguards.⁵ Later that year, the UK followed up by sharing the details of its fissile material transparency, safeguards and irreversibility initiatives with IAEA member states in INFCIRC/570.⁶

In Russia, information became available through the cooperative threat reduction program. Although the Gore-Chernomyrdin Commission set in motion ambitious plans to institutionalize transparency regarding nuclear warheads and fissile material stocks, these were never fully realized. Some attribute this to reluctance by the Russians to reveal nuclear secrets, but there was also some hesitance in the United States regarding reciprocity. A key question moving forward is whether the useful U.S.-Russian experience can be rekindled in light of a new Russian secrecy law and a new U.S. administration with little experience in these matters.

⁴ See documents released at Department of Energy Openness Press Conference, December 7, 1993, <https://www.osti.gov/opennet/reports/dec71993.pdf>

⁵ <http://fissilematerials.org/library/mod98.pdf> (p. 383 of pdf, unpaginated)

⁶ Subsequently, the UK released further details about its plutonium and HEU holdings, identifying several errors caused by poor historical record keeping in the process. Much of its 2006 report detailing the audited historical stock of HEU through 2002 is based upon historical transport records, and notes considerable difficulties arose where the records did not distinguish between civilian and military materials, where units of mass were not specified, where enrichment levels were not indicated, or where records did not exist at all.

France's post-Cold War foray into transparency included President Mitterand's statement about its nuclear forces in 1994 which offered details about the number of French nuclear tests, French air and sea-based deterrent capabilities, and the number of French nuclear warheads ("around 500").⁷ France has not provided information on fissile material stockpiles or production histories, nor has it declared any material excess to defense needs or offered any material up for verification.

Other nuclear weapon states found little in the end of the Cold War to compel them towards greater transparency. China has been consistently transparent about its nuclear strategy and some qualitative aspects of its program, but has not revealed quantitative limits. While the other four NPT nuclear weapon states declared in 1995 that they stopped producing fissile material for weapons, China remains silent even though most experts assess China too has stopped production.

Outside of the NPT, imperatives for secrecy endure. India indulged in the fiction of its peaceful nuclear test explosion for more than twenty years until the 1998 tests prompted public release of its draft nuclear weapons doctrine.⁸ Like China, India has been transparent about its doctrine, but not numbers. Although the process to win an NSG guidelines exemption should have resulted in greater transparency about Indian nuclear capabilities, there is scant evidence of this, best exemplified by the ridiculously terse Additional Protocol language that requires India to do nothing more than report on material it exports.

Ironically, Pakistan has been loudest in criticizing India's transparency, even as it jockeys for similar treatment by the international community. Proposals for a similar deal for Pakistan in the last few years have generally included measures designed to enhance transparency in Pakistan's nuclear program, for example, separation of civilian and military facilities and implementing additional measures (e.g., Additional Protocol) to provide more information and access to facilities, etc. Overall, however, Pakistan provides little information about its nuclear program, weapons stockpile, and fissile material holdings. It has made far fewer statements than India about its reactors and provided no statements on the size of its arsenal. Significant information, however, emerged from questioning A.Q. Khan over ten years ago, including oral and written testimonies, documents, and video footage of a centrifuge cascade hall.⁹

Last but not least are Israel and North Korea. Israel has been more secretive even than North Korea about its nuclear weapons capabilities and no one expects that to improve, particularly in the absence of any progress on a multilateral conference on weapons of mass destruction in the Middle East. Israel has never confirmed or denied it has a nuclear weapons program, and information about its fissile material production is scarce. Nearly all of what is known about Israel's nuclear weapons program and fissile material production history comes from a few sources: the Sunday Times interview by Mordechai Vanunu, now-declassified U.S. intelligence

⁷ <http://www.mitterrand.org/Francois-Mitterrand-et-la-618.html>

⁸ <http://mea.gov.in/in-focus-article.htm?18916/Draft+Report+of+National+Security+Advisory+Board+on+Indian+Nuclear+Doctrine>

⁹ For example, Khan told investigators that Pakistan received approximately 50 kg of weapons-grade uranium from China.

documents, and known characteristics of technologies provided to Israel by France and the United States.

With regard to North Korea, we can expect some official announcements which will be difficult to corroborate, but little else unless negotiations to limit its nuclear program resume. Still, there is significant information from the 1994 Agreed Framework, limited IAEA safeguards visits, subsequent Six Party Talks declarations, and Track II diplomacy visits. The five nuclear weapon tests are another data point, but shed little light on North Korean capabilities, at least at an unclassified level. Without access to North Korean facilities or personnel, estimates must rely on information gathered in satellite images, officially published photographs and videos, historical documents, and sporadic visits by western observers to nuclear facilities, especially those by experts like Sig Hecker and David Albright.¹⁰ Nonetheless, the list of uncertainties about North Korea's program is long, including its HEU production capability, warhead types, miniaturization, and missile delivery ranges.

¹⁰ http://cisac.fsi.stanford.edu/sites/default/files/khucisacfinalreport_compressed.pdf

APPENDIX II
International Panel on Fissile Materials Transparency matrix¹¹

	United States	Russia	United Kingdom	France	China
Number of total warheads	Approximate	No	Yes (upper limit)	Yes (upper limit)	Relative (out of date)
Number of deployed warheads	Yes (strategic only)	Yes (strategic only)	Yes (planned)	Yes	No
Dismantlements	Yes	No	Yes (no details)	Yes (no details)	No
Verification	Partial	Partial	No	No	No
Fissile material stockpiles	Yes	No	Yes (no details)	No	No
Production histories	Yes	No	No	No	No
Excess/Disposal	Yes (nothing new)	Yes (nothing new)	Yes (nothing new)	No	No
Verification	Partial	Partial (but no longer)	Partial (some plutonium)	No	No
International R&D activities	Yes	No	Yes	No	Some

Table 4. Nuclear Transparency Scorecard, 2015. Information on nuclear warhead and fissile material inventories and their status in NPT nuclear weapon states. At the 2010 Review Conference, as part of the Action Plan agreed in the Final Document, nuclear weapon states committed to more transparency and to regularly report progress on reductions in the stockpile of nuclear weapons (Actions 2 and 5) and to declare excess and offer for IAEA safeguards material no longer needed for military purposes (Action 16). This scorecard highlights relevant categories and areas (shown in green and in white) in which progress has been made.

¹¹ See page 36, <http://fissilematerials.org/library/gfmr15.pdf>.