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Transparency and Secrecy in Nuclear Weapons

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Transparency and secrecy in nuclear weapons

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Increased transparency of nuclear-weapons-related information is an indispensable prerequisite for more progress in nuclear disarmament and its verification. For many years, and on various occasions, it has been demanded by the international community.

At the 2000 NPT Review Conference, nuclear transparency was part of the thirteen practical steps for the systematic and progressive efforts to implement Article VI of the Treaty on the Nonproliferation of Nuclear Weapons, which were agreed on by consensus. Step 9B stipulates "increased transparency by the nuclear-weapon States with regard to their nuclear weapons capabilities and the implementation of agreements pursuant to Article VI and as a voluntary confidence-building measure to support further progress on nuclear disarmament." And step 12 stipulates regular reporting on the implementation of nuclear disarmament. But there is not yet any such commitment on the part of the nuclear-weapon states.

Today, the world is not even informed about the status quo of nuclear disarmament: How many nuclear weapons are stationed in which countries? Which types of weapons? How many are being held in reserve and how many are being dismantled? The numbers are not exactly known; the reports on weapon dismantlement remain vague. Only a few countries have published figures of their holdings of nuclear materials, the quantities of others are still shrouded in secrecy.

Transparency would also be needed during the process of nuclear disarmament. There are plenty of open questions that must be dealt with in order to prepare for the next disarmament steps. They do not only concern numbers, types or locations of existing warheads but also quantities and properties of fissile materials, information on production facilities or information on activities that help understand the compliance with nuclear arms control treaties.

Examples of possible further steps in nuclear disarmament are: verification of nuclear weapon disarmament; a fissile material cut-off treaty (FMCT); projects and treaties on the disposition of excess weapons plutonium – and safeguards, projects and treaties on assistance for improving the security of fissile materials in Russia; further reforms of international safeguards, especially in cases where these are implemented in nuclear-weapon possessing states outside the NPT; and the implementation of the Comprehensive Test Ban Treaty (CTBT). All such measures would be facilitated by more information related to nuclear weapons, but the situation is still far from satisfying. A lot of this information is still secret and their owners do not want to release it.

There are several reasons for this secrecy. An obvious one is counter-productive side effects to transparency: some information might be proliferation relevant; e.g. it has the potential to be useful in illegal nuclear-weapon programs elsewhere. This is a major problem because intrusive verification goes to the heart of sensitive nuclear-weapons information and might inadvertently spread knowledge that is better kept secret. Although nuclear transparency must have a limit, therefore, it is unclear where this limit should be placed: where an ideal demarcation between transparency and secrecy should lie. Apparently, the secrecy goes far beyond what is necessary for reasons of nonproliferation.

This paper will focus on information related to nuclear weapons with the following questions: Is transparency of the information useful for nuclear disarmament and arms control? Would transparency enhance the risk of nuclear proliferation? Would it pose other security risks, and which kind of security risks are they? Is the current secrecy of information adequate? Which other reasons for secrecy may be assumed?

Transparency of nuclear-warhead arsenals and deployments

The most prominent type of information that has frequently been asked for in calls for transparency is information on nuclear warheads and deployments. An example was a proposal by the German Foreign Minister Klaus Kinkel in 1993 for a nuclear-weapon register with the UN.[1] It was unanimously rejected by the nuclear-weapon states.

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[1] K. Kinkel, "German 10-point initiative for nuclear nonproliferation", Bonn, 15 December 1993. For the significance of this proposal and the reaction of the NWS see: H. Müller, The Nuclear-weapons Register – A Good Idea Whose Time Has Come, PRIF Reports No. 51, June 1998.

Information on nuclear warheads that could be useful for arms control includes numbers, identification codes and names, types, yields, ranges, operational status (whether deployed, reserve, in maintenance etc.), delivery systems, production history, and locations.

So far, however, no nuclear-weapon state has published all these details, although most have made some statements or published documents providing some related information. The U.S. and Russia have exchanged information on strategic nuclear-warhead delivery systems as part of nuclear arms control treaties – mainly START and INF. However, the major agreements on strategic nuclear arms between the two superpowers have focused mainly on delivery vehicles and launchers. Warheads were dealt with largely through counting rules that attributed a certain number of deployed warheads to a specific delivery vehicle.

Transparency of warhead stockpiles would have remarkable benefits. It would give others a realistic image of capabilities. During the Cold War, the fear of a disarming first-strike attack was a major trigger of the nuclear arms race. Also today, the secrecy of some might lead to new arms build-ups by others, which, in turn, could create an obstacle to further reductions. Opacity in nuclear holdings still is an important basis of mutual suspicion that could fuel new crises. Transparency of stockpiles would avoid unnecessary ambiguities and would contribute to the prevention of potential new arms races and competitions.

Therefore, transparency in nuclear warheads has been on the arms control agenda for several years: After the Cold War, the U.S. and Russia have engaged in a substantial nuclear arms reduction process, notably with the two START Treaties, although currently, with the conclusion of the Strategic Offensive Reductions Treaty (SORT), the process seems to have come to a halt. START II has never entered into force. In contrast to the START Treaties, SORT does not provide for any transparency or verification measures. Nevertheless, if the disarmament process is to be revived, transparency of warhead stocks would constitute an indispensable prerequisite. A transparency regime could start with bilateral declarations between Russia and the United States, and finally end with an official UN register of all nuclear warheads worldwide.

A special concern is warheads that are not yet covered by any control regime, either in the active stockpile or in a deposit and that are ready for use, e.g. tactical nuclear weapons. As long as no information on these stockpiles is available, the potential for mistrust is high. Any success in nuclear-weapons reductions will go along with doubts as to whether the reductions are really meaningful or whether they merely constitute a shift of warheads to other locations where they are not accounted for.

Does the release of this kind of information on nuclear warheads pose a proliferation danger? There might be cases in which the security of deployed arsenals is insufficient and the owner state fears that terrorists could attack storage sites and capture warheads. Rumours exist that the Pakistani nuclear arsenal might be in this situation.[2] The most important reason why states might prefer to keep information on nuclear-warhead deployments and arsenals secret is the fear that its revelation would weaken the security of a state and its allies because it would encourage a first strike and therefore undermine deterrence. But why must the secrecy of locations apply to all nuclear weapons? As an example, a retaliatory force would still be credible if it is exclusively based on nuclear-armed submarines.

Smaller nuclear powers might additionally favour a policy of quantitative ambiguity as a way of protecting nuclear deterrence until they have built a survivable nuclear retaliatory force.[3] In their view, geographical ambiguity can contribute to nuclear deterrence too, as well as ambiguity of other information such as yields, ranges, or operational status.

Big nuclear powers do not have this problem of asymmetry. Nevertheless, during the Cold War, the intrinsic secrecy of the Soviet system was a particular concern to the West and fuelled suspicions. The belief that uncertainty contributed to deterrence was a major motivating factor for secrecy on both sides. The following quotation from a U.S. report on inadvertent releases of classified information shows that it still prevails:[4] “The inadvertently released nuclear-weapons utilisation information... detailed in this report could assist potential adversaries in assessing the strengths of the U.S. nuclear arsenal.”

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2 David Albright, Securing Pakistan's Nuclear-weapons Complex, Paper for the 42nd Strategy for Peace Conference, Warrenton, Virginia, 25–27 October 2001, www.isis-online.org/publications/terrorism/stanleypaper.html; 68 Pakistan's Nuclear Dilemma, Carnegie Endowment for International Peace, Non-Proliferation Project Roundtable, 2. Oktober 2001. Transcript: www.ceip.org/files/events/Paktranscript.asp.

3 Li Bin, Appendix 3A. China and nuclear transparency, in: Transparency in nuclear warheads and materials, Ed. Nicholas Zarimpas, Oxford University Press, p. 50, SIPRI 2003

4 U.S. Department of Energy, Office of Classified and Controlled Information Review, Eleventh Report on Inadvertent Releases of Restricted Data and Formerly Restricted Data under Executive Order 12958 (Deleted Version)(U), May 2003, http://www.fas.org/sgp/othergov/doe/inadvertent11.html

Similarly, there is still the desire not to reveal weaknesses of a weapon system, in order to maintain its survivability. Nevertheless, the question must be asked to which extent such a policy is exaggerated.

In contrast to some transparency in strategic nuclear weapons that has been created between the U.S. and Russia by arms control treaties, transparency in tactical nuclear weapons – an entire category of nuclear weapons – is still lacking. They are only subject to an informal regime created by unilateral declarations by George Bush and Mikhail Gorbachov in the autumn of 1991. Since then, both sides have substantially reduced their tactical arsenals, but information exchange was limited to periodic updates on progress. There was no monitoring or any other meaningful transparency measures. Neither side has given a comprehensive overview on their tactical arsenals.[5] In addition, weapons in various reserve categories are completely omitted from official accounts.

The most detailed information about its nuclear weapons has been supplied by the U.S., although officially, it does not reveal deployment locations or numbers of warheads. However, it has released an official account of the total number of nuclear warheads in its stockpile up to 1961, the number of warheads retired or dismantled up to 1994, the number assembled each year, and some additional information.[6] Past stockpile numbers, which are partially composed of weapon systems still in the stockpile remain classified, and the release of any information that goes beyond this document is deemed to be harmful to national security. However, independent observers are able to collect quite comprehensive and unambiguous lists of warhead-related data from information in the public domain, including government publications and announcements.[7]

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5 William C. Potter, Nicolai Sokov, Harald Müller and Annette Schaper, Tactical Nuclear Weapons – Options for Control, UNIDIR Research Report, Geneva, 2000

6 Department of Energy, Declassification of Certain Characteristics of the United States Nuclear-weapon Stockpile, http://www.osti.gov/html/osti/opennet/document/press/pc26.html, as of December 2003

7 Examples of organizations that collect and publish public domain information on nuclear weapons are the Natural Resources Defense Council (NRDC), the Federation of American Scientists (FAS), the Center for Defense Information (CDI), and individuals. Examples of such documentations are: see W. M. Arkin, R. S. Norris, J. Handler, Taking Stock – World-wide Nuclear Deployments 1998, NRDC, Washington, D.C., 1998, p. 73, http://www.nrdc.org/nuclear/tkstock/tssum.asp#download; NRDC Nuclear Notebook prepared by Robert S. Norris and William Arkin of the Natural Resources Defense Council, published in The Bulletin of the Atomic Scientists, http://www.thebulletin.org/issues/nukenotes/nukenote.html; Chuck Hansen, Swords of Armageddon, Chukelea Publications, Sunnyvale, 1995; The High Energy Weapons Archive, http://nuclearweaponarchive.org/, until May 2002 also hosted by FAS; Center for Defense Information (CDI), http://www.cdi.org/issues/nukef&f/database/usnukes.html

It is much more difficult to obtain specific information on the Russian arsenal. Although the Russian government is more open than the former Soviet government was, there is no comparable disclosure of information related to warheads. Organisations like the Natural Resources Defense Council (NRDC) that collect this information cite U.S. intelligence reports, Foreign Broadcast Information Service (FBIS) publications, publications of independent Russian researchers, and information flows. Independent Russian researchers have started to collect information on strategic nuclear weapons and to publish them.[8] Only a few sources originate from the Russian Government, in contrast to the U.S.

The British Defence Ministry has published some information on warhead numbers and their operational status.[9] France has published figures, although in a less visible way via presidential speeches and legal documents attached to procurement laws and defence budgets.[10] In Britain and France, the locations are fairly well known, and the number of useful official publications is quite large. China provides almost nothing officially,[11] the only sources for independent analysts are U.S. government intelligence reports and the Taiwanese press.

The nuclear-weapon possessing states that are not party to the NPT remain opaque. India and Pakistan have spectacularly demonstrated the fact that they possess nuclear warheads, through explosive testing, but they do not reveal much further information. India officially announces yields of warheads, but no numbers. Israel neither confirms nor denies even the possession of nuclear weapons.

Some of the information has been published on purpose, but on a low ranking governmental level, e. g. in attachments to military procurement funding requests, in public comments of low ranking governmental officials, or even leaked to the press or researchers on an unattributable basis. This is the most informal way of creating transparency to a broader

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8 See website of the Center for Arms Control, Energy and Environmental Studies at the Moscow Institute of Physics and Technology (MIPT): Current Status and Future of Russian Strategic Forces, http://www.armscontrol.ru/start/rsf_now.htm, 2002; Pavel Podvig (ed.), Russian Strategic Nuclear Forces, The MIT Press, 2002

9 Royal Navy, Submarine Capability, http://www.royalnavy.mod.uk/rn/content.php3?page=258

10 Camille Grand, Nuclear-weapon States and the Security Dilemma, in: Transparency in nuclear warheads and materials, Ed. Nicholas Zarimpas, Oxford University Press, p. 32, SIPRI 2003

11 Li Bin, see fn. 3

audience. Other means are invitations to site visits, or verification measures, the intrusiveness of which can vary over a wide range.

Transparency in technical information on nuclear warheads

Information on technical details of individual warheads is much more sensitive than information on deployments. But some of it would be useful for the verification of warhead dismantlement. Such verification would seek to distinguish between a real and a fake warhead and its identification, and it aims at creating assurance that a sealed container holds a specific warhead type. Therefore, technical properties must be explored with a certain degree of intrusiveness in order to give an answer with some degree of assurance. But most of these technical properties are classified.

It would not be necessary to learn all technical details of a specific warhead. The verification tasks could be accomplished with a subset of this information. Examples of technical information on warheads that would be helpful in verification are: their mass and shape, the isotopic and chemical composition, the size of a pit and of its reflector, the types and shapes of conventional explosives and other components, the mass, shape and design of secondaries, or information on other components such as ignition electronics or the outer casing.

In any meaningful future nuclear disarmament, transparency of warhead dismantlement will play an important part. In a Joint Statement of Presidents Clinton and Yeltsin at the Helsinki Summit in March 1997, they stated that a START III Treaty should contain, among other things, "Measures relating to the transparency of strategic nuclear-warhead inventories and the destruction of strategic nuclear warheads…"[12] So far, verification in nuclear arms control has covered mainly delivery systems, but has hardly affected the warheads themselves. An exception is the INF Treaty, which required verification capable of distinguishing between banned SS-20 missiles from permitted SS-25 missiles. The most recent nuclear arms control agreement – SORT – falls short of all expectations, as it does not include any verification at all.

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[12] President Clinton and President Yeltsin, Joint Statement on Parameters on Future Reductions in Nuclear Forces, White House Fact Sheet, Helsinki, 21 March 1997, printed in: Disarmament Diplomacy, April 1997, p. 32.

The problem of the friction between transparency needs for warhead identification and secrecy for the protection of sensitive information has already been investigated during an experiment conducted by the U.S. Arms Control and Disarmament Agency (ACDA),[13] in which security personnel played the role of inspectors who tried to distinguish warheads from other objects. The experiment clearly showed a direct relation between the accuracy of the inspection results and the amount of classified information that had been released. Nevertheless, the study concluded that compromises are possible.

Measures related to finding technical solutions to transparency problems have been investigated in detail by the U.S. and Russia since the mid-1990s. Their significance has increased, as it has become clear that both states are not prepared to exchange classified technical information.[14] To a certain extent, such technical solutions may help to bridge this lack of political will or legitimate concerns, but there are limitations, as the technical solutions themselves rely on a certain degree of nuclear transparency.

The aim of the technical measures is to protect as much sensitive information as possible while at the same time creating the highest possible assurance that an object can be identified correctly, whether it contains a specific nuclear warhead or a decoy. At the heart of these measures is radiation measurement. In principle, experts can draw a wealth of detailed information of the warhead construction from measurements. As an example, in July 1989, a joint Russian-U.S. experiment, the so-called "*Black Sea Experiment*", took place that aimed to detect a cruise missile warhead by passive methods.[15] Later, Tian Dongfeng, a Chinese nuclear-weapon expert, demonstrated which information on the warhead could be deduced

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[13] United States Arms Control and Disarmament Agency, Final Report – Volume I: Field Test FT-34. Demonstrated Destruction of Nuclear Weapons (U), January 1969, declassified in 1990. See also Frank von Hippel, The 1969 ACDA study on warhead dismantlement, Science & Global Security, vol. 2, no. 1, p. 103, 1990

[14] Oleg Bukharin, Appendix 8A. Russian and US technology development in support of nuclear warhead and material transparency initiatives, in: Transparency in nuclear warheads and materials, Ed. Nicholas Zarimpas, Oxford University Press, p. 165, SIPRI 2003

[15] Steve Fetter, Thomas B. Cochran, Lee Grodzins, Harvey L. Lynch, Martin S. Zucker, Measurements of Gamma Rays from a Soviet Cruise Missile, in: F. v. Hippel, R. Z. Sagdeev, Reversing the Arms Race — How to Achieve and Verify Deep Reductions in the Nuclear Arsenals, New York 1990, p. 379; S. T. Belyaev, V. I. Lebedev, B. A. Obinyakov, M. V. Zemlyakov, V. A. Ryazantsev, V. M. Armashov, S. A. Voshchinin, The Use of Helicopter-borne Neutron Detectors to Detect Nuclear Warheads in the USSR-US Black Sea Experiment, in: v. Hippel/Sagdeev, p. 399.

from the published “Black Sea” spectrum.[16] This information is remarkably detailed, and far too transparent, in the opinion of the Chinese author.

Information protection techniques aim to shield spectra and other information and to provide not much more than a plain yes or no answer to the question whether an object is a specific warhead. The joint U.S.-Russian scientific groups have investigated several variations of so-called “*information barriers*” that would allow verification without revealing too much sensitive information. Information barriers are closed devices involving computers without permanent memories that give out only the minimum information that is necessary for the verification process.[17] However, it is disputed among experts whether this method does really protect sensitive information securely enough. In case both sides would share more information on nuclear warheads, these problems would be less severe.

The major reason for secrecy is non-proliferation. When specific technical warhead-related information becomes known, there is the fear that it could assist proliferators in their acquisition programs. In contrast to the basic physics and simple models of nuclear weapons, which are publicly known, information on quantitative technical details is not available. It would be useful for proliferators because there are many laborious steps between a basic understanding of the operating principles and an actual technical blueprint. The task of development is not insurmountable and can be accomplished by ‘medium developed’ states within a couple of years. Nevertheless, the undertaking would be easier and quicker if certain technical details were known to proliferators beforehand.

However, the information that is useful to a proliferator's program and the information that is useful for warhead verification is not necessarily the same. It is only partly overlapping, and much information is being kept secret although proliferation dangers are highly unlikely.

The owners may hesitate to reveal their technical abilities for various reasons: a technological superiority could motivate adversaries to engage in strengthened efforts to achieve similar capabilities. Some information might reveal technical vulnerabilities that an adversary

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[16] Tian Dongfeng, Xie Dong, Liu Gongliang, High Energy Gamma-Ray "Fingerprint" – A Feasible Approach to Verify Nuclear Warhead, in: Institute of Applied Physics and Computational Mathematics, Program for Science and National Security Studies (Arms Control Collected Works), Beijing 1995, p. 63. The author suggests not using the whole spectrum for warhead identification but just a small part of it. It would be sufficient and would protect other information.

eventually would exploit, which would undermine deterrence. The Cold War tradition of surprising the enemy may also indirectly play a role. However, this motive becomes increasingly outdated for the more advanced nuclear-weapon states, therefore, it may be better categorised as conservative inertia. In addition, we may speculate whether there are cases in which the owners want to hide technical weaknesses because they want to bluff the world to believe in greater technical prowess than is actually the case. An example is the Indian nuclear tests of May 1998. Although India claims to have detonated a thermonuclear weapon, this assertion must be doubted, and probably it was only a boosted fission explosion.[18]

The highest degree of openness and effort can still be observed in the U.S. At the end of 1993, as part of an Openness Initiative, the U.S. DoE declassified and published a large amount of technical information on nuclear warheads.[19] In line with newly developed criteria, this information was regarded as no longer posing a proliferation or security threat, and there was no danger of an undesirable disclosure of America's own technological state of development. However, in the last few years, a reversal of this trend can be observed.[20] An indication is the fact that a lot of documents that have been published as a result of the Openness Initiative, have been taken from the net. Another indication is the scandal about alleged Chinese spying on U.S. nuclear weapons. A Congressional report (Cox-Report[21]) on the allegation resulted in calls for more secrecy and less international collaboration, although it has been criticised by some for containing many mistakes and for causing a degree of hysteria.[22]

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17 On information barriers, see Bukharin, footnote 14

18 The design of a thermonuclear weapon needs precise experimental data on the fist stage fission trigger, which can be obtained only by preceding nuclear tests. Seismologists have pointed out that the yield of the explosion was only a quarter of what the Indian government has announced which falls below a typical thermonuclear explosion, see: Terry C. Wallace, The May 1998 India and Pakistan Nuclear Tests, Seismological Research Letters, September/October 1998, p.386-393.

19 U.S. Department of Energy, Office of Declassification, Restricted Data Declassification Policy 1946 to the Present (RDD-7), January 1, 2001, available at the internet at: http://www.fas.org/sgp/othergov/doe/rdd-7.html

20 Bush Administration Documents on Secrecy Policy are being compiled by Steven Aftergood and made available at: http://www.fas.org/sgp/bush/index.html

21 Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China, Congressional Report, Mai 25, 1999, available at http://www.house.gov/coxreport/

22 A Richard L. Garwin and Wolfgang K.H. Panofsky, Nuclear Secrets: Rush to Judgment Against China, International Herald Tribune Tuesday, August 3, 1999. A quotation from this article is: "Each of us has a right to make up his or her own mind, but not to make up his or her own facts. Yet that seems to be happening on the nuclear threat from China." See also Richard L. Garwin, Why China Won't Build U.S. Warheads, Arms Control Today April/May 1999

Russia is far less transparent. The extent of nuclear secrecy that still exists in Russia goes far beyond the requirements for non-proliferation and national security.[23] A variety of bilateral informal U.S.-Russian transparency commitments have been initiated in the 1990s but have never been fulfilled.[24] An example is the attempt to sign an Agreement of Cooperation between Russia and the U.S. permitting the sharing of classified information, but it was stopped by Russia in 1995. In January 1994, Presidents Clinton and Yeltsin agreed on establishing a working group on transparency and irreversibility of nuclear reductions, but it has never been implemented. In March 1994, both sides agreed on inspections of fissile materials from dismantled weapons. Again, these inspections have never been implemented. In May 1995, both presidents issued a statement on safeguards, transparency, and irreversibility reaffirming their commitments and agreed to have experts investigate details. The aim was to conclude an agreement for co-operation that would allow the parties to exchange sensitive information. These talks were terminated by the Russian side without explanation.[25] Apparently, too much information was involved that the Russians deemed too sensitive to be shared even on the bilateral level with another nuclear-weapon state.

In Spring 2000, the British Government published a study on nuclear transparency and verification.[26] Its aim was to "identify the technologies, skills and techniques required and what is available in this country" for developing British expertise in the verification of nuclear disarmament. It is path breaking for several reasons: First, the verification under discussion is unprecedented and affects the most sensitive part of nuclear disarmament, the irreversible destruction of nuclear warheads. Second, the need for greater transparency by the nuclear-weapon complexes is emphasised. Third, the report promises cooperation with experts outside the nuclear-weapons establishment, including non-governmental organisations. The report proposes, not surprisingly, the creation of a Verification Research Programme at the British Atomic Weapons Establishment. This program has indeed been set up. At several NPT

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[23] Oleg Bukharin and Kenneth Luongo, U.S.-Russian Warhead Dismantlement Transparency: The Status, Problems, and Proposals, PU/CEES Report No. 314, April 1999.

[24] Matthew Bunn, The next Wave: Urgently needed new steps to control warheads and fissile material, Report Carnegie Endowment for International Peace and Harvard University, March 2000, available at www.ksg.harvard.edu/bcsia/atom, p. 47.

[25] Steve Fetter, A Comprehensive Transparency Regime for Warheads and Fissile Materials, Arms Control Today, January/February 1999.

[26] Atomic Weapons Establishment, Confidence, Security and Verification: The challenge of global nuclear-weapons arms control, AWE/TR/2000/001, in the internet at http://www.awe.co.uk/Images/awe_study_report_tcm6-1777.pdf. For a short critique see Annette Schaper with Trevor Findlay, Confidence, Security & Verification, Trust & Verify, No. 92, July 2000.

meetings, the British Government has reported on its progress.[27] In its final report to the 2005 NPT Review Conference, it elaborates on useful verification technologies, on the need to find compromises concerning intrusiveness, on the necessity to protect sensitive design information, and on its intention to continue monitoring and evaluating technological developments in this field. The British efforts can be regarded as remarkable progress in comparison to previous opacity. Nevertheless, they still fall behind U.S. efforts during its Openness Initiative: Although they provide details of how to verify nuclear disarmament and the dismantling of warheads, they still lack elaborate technical declassification. On the other hand, while the Bush Administration tries to reverse some achievements of the Openness Initiative, the British Government shows no sign to back away from its commitments.

Initiatives comparable to those in the U.S. and Britain are absent in France. So far, no declassification or transparency campaign exists. China's interest in nuclear arms control has grown during the last few years. However, all publications are based on foreign sources, and information on Chinese nuclear weapons additional to what is already published elsewhere does not exist. There are no transparency initiatives comparable to those in the U.S. and Britain. While Chinese experts are interested in the topic of verification of warhead dismantlement, they are very cautious about the degree of the intrusiveness.[28] The other nuclear-weapon possessing states – India, Pakistan, and Israel – also lack transparency of their nuclear complexes.

Transparency of fissile material stocks and production facilities

The dismantlement of nuclear warheads generates nuclear and non-nuclear-warhead components and fissile materials. Dismantlement of warheads takes place not only as a result of nuclear disarmament, remanufacturing is also a part of the maintenance process of an arsenal. Therefore, nuclear-weapon possessors maintain reservoirs and pipelines of fissile materials and components for nuclear warheads, in addition to their warheads in deployment

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[27] Verification of nuclear disarmament: final report on studies into the verification of nuclear warheads and their components, Working paper submitted by the United Kingdom of Great Britain and Northern Ireland, 18 April 2005, NPT/CONF.2005/WP.1, http://daccess-ods.un.org/access.nsf/Get?OpenAgent&DS=NPT/CONF.2005/WP.1&Lang=E; an interim report is: Verification of nuclear disarmament: first interim report on studies into the verification of nuclear warheads and their components: Working paper submitted by the United Kingdom of Great Britain and Northern Ireland, NPT/CONF.2005/PC.II/WP.1, 23 April 2003, http://daccess-ods.un.org/access.nsf/Get?OpenAgent&DS=NPT/CONF.2005/PC.II/WP.1&Lang=E

[28] See footnote 16.

and reserve. These materials constitute an additional reserve for potential rearmament. Transparency of warheads would be incomplete if it was not supplemented by transparency in fissile material stocks.

Information that would be beneficial for nuclear disarmament and verification includes: quantities of weapon plutonium and HEU, broken down in the political categories “reserve material”, “remanufacturing pipelines”, or “still in military jurisdiction but considered excess to weapons needs”; the same quantities broken down in technical categories such as isotopics, chemical composition, physical shapes e.g. pits, recast metal objects, oxide powder, or scraps and residues, and broken down in locations e.g. at storage and manufacturing sites or in various disposition processes; information on additional civilian stocks and HEU for naval propulsion; and an overview on all production capabilities e.g. reprocessing and enrichment, also reactors, fuel fabrication facilities and other elements of the nuclear-fuel cycle. Documentation of production history might add to a clearer picture.

Transparency in fissile materials has many benefits for arms control. First of all, it would complement transparency on warhead stocks and would give a realistic picture of the current situation of nuclear armament. Transparency in fissile materials, especially on those from or for nuclear weapons, would create international confidence that the nuclear disarmament process is taking place as declared. The more secrets are abandoned and information is declared, the more the overall picture becomes complete and convincing. Initial voluntary declarations could pave the way for binding commitments, for example, through the establishment of an international register of fissile materials and production capabilities.[29]

Secondly, transparency in fissile materials would be a prerequisite for efforts to stem nuclear proliferation. Major sources of proliferation-relevant materials and technologies can be found in nuclear-weapon states. They control the materials and technologies through solely national means, without obligation to adhere to international standards or to have the security of their nuclear materials inspected by an international agency. The proliferation dangers have increased since the end of the Cold War because of the large quantities of weapon materials that are becoming surplus to requirements. The processes of warhead dismantlement, material transport, storage, and disposition create additional diversion risks. Incomplete accounting

[29] David Albright, Frans Berkhout, William Walker, Plutonium and Highly-Enriched Uranium 1996 – World Inventories, Capabilites and Policies, SIPRI (Oxford University Press), especially pp. 6–8 and chapter 15.

records from the past make it almost impossible to determine whether fissile materials could already have been illicitly removed.

A variety of cooperation projects, especially between Russia and other states, notably the U.S., are aimed at enhancing the security of fissile materials and warheads. Transparency in fissile materials would facilitate international cooperation to improve the situation, for example, in respect of international collaboration in material protection, control and accountancy (MPC&A) measures for storage and transportation. Controls aimed at ensuring that funds are being spent properly sometimes conflict with secrecy on fissile materials and facilities. As an example, an achievement of U.S.-Russian CTR cooperation is the construction of a storage facility for excess weapon materials and warhead components. However, the U.S. wants to ensure that the materials stored at the facility are indeed of weapons origin. But the Russian side refuses to grant sufficient transparency, not only because of its own secrecy requirements but also because the U.S. refuses to offer reciprocal transparency at corresponding sites of its own. The more secrets are released the easier it becomes to incorporate excess nuclear-weapon materials into international CTR activities. The international safeguards in the non-nuclear-weapon states have greatly reduced the danger of nuclear proliferation. They have triggered discipline and high standards of physical protection, material accountancy and control of nuclear materials and installations. The major dangers now result from the lack of similar standards in nuclear-weapon possessing states.

Thirdly, transparency in fissile materials would facilitate technical disarmament measures, for example, in the disposition of plutonium and HEU from dismantled weapons. For several years, the problem has been studied of how to dispose of excess weapons plutonium in a way that minimises proliferation dangers and maximises the technical hurdles for rearmament, nationally and internationally.[30] Studies dealing with Russian material always cope with the

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[30] Prominent examples for studies are: U.S. National Academy of Sciences: National Academy of Sciences (NAS), Committee on International Security and Arms Control (CISAC), Management and Disposition of Excess Weapons Plutonium, Washington 1994; NAS, CISAC, Management and Disposition of Excess Weapons Plutonium: Reactor Related Options, Washington 1995. A German – French – Russian project for the building of a MOX pilot plant for Russian disarmament plutonium and an American – Russian agreement on the non-military use of Russian disarmament uranium had been among the most advanced plans until the German Government cancelled its support because of domestic political reasons. See Gesellschaft für Anlagen- und Reaktorsicherheit (GRS) mbH, Siemens Aktiengesellschaft und Ministerium für Atomenergie der Russischen Föderation (MINATOM): Basisauslegung für eine Pilotanlage zur Produktion von Uran-Plutonium-Brennstoff aus waffengrädigem Plutonium und zum Einsatz dieses Brennstoffs in Kernreaktoren (Principal design of a pilot plant for the production of uranium plutonium fuel from weapon grade plutonium and for the use of this fuel in nuclear reactors), Final Report, 28.02.1997. See also N.N. Yegorov et al. The AIDA-MOX 1 Program: Results of the French-Russian Study on Peaceful Use of plutonium from

problem that the material is still tainted with so many secrets. In the studies on the disposition option of fabrication mixed oxide fuel (MOX) from excess weapons plutonium, the isotopic composition of the plutonium is still secret and must therefore be replaced by fictitious assumptions.[31] But for the design of a MOX facility, this information is needed in order to calculate its criticality and to design the elements of the facility accordingly.

Fourthly, transparency in fissile materials would facilitate the verification of future nuclear arms control treaties such as the FMCT which has been under consideration at the Conference of Disarmament (CD) for several years,[32] and which seeks to ban the production of fissile materials for nuclear explosives. It is disputed whether such a treaty should also cover material produced prior to its entry into force. Nevertheless, even if it does cover only future production, its verification will have to monitor production facilities. A certain degree of transparency of these facilities would be a prerequisite for monitoring, which may be problematic for several reasons: Some owners might wish to protect information on their past activities. Some facilities are co-located with weapons production and could reveal other sensitive information, not only isotopics but also information that allows drawing wider conclusions. An example for such wider conclusions is production histories or information on plutonium re-fabrication. Some states might want to continue with the production of HEU for military naval reactors, and therefore want to protect sensitive information on these reactors. The more secrets must be protected, the more complicated and less convincing is the verification. It is not clear whether these problems can be solved by means such as information barriers or managed access during inspections. It is likely that possessor states will negotiate for an exemption of these facilities from verification, which would be a dissatisfying outcome. This secrecy also poses obstacles to attempts to monitor civilian production sites in nuclear complexes when there is strong civil-military integration.[33]

Dismantled Russian Nuclear Weapons, in IAEA: Nuclear-fuel cycle and reactor strategies: Adjusting to new realities, Proceedings of an International Symposium held in Vienna, 3-6 June 1997, p. 93; Joint United States / Russian Plutonium Disposition Study, Prepared by the Joint U.S.-Russian Plutonium Disposition Steering Committee. U.S. Department of Energy, Washington, D.C., September 1996

31 See GRS/Siemens/Minatom, footnote 30

32 A. Schaper, Principles of the verification for a future Fissile Material Cut-off Treaty (FMCT), PRIF Reports No. 58, Frankfurt 2001, http://www.hsfk.de/publication_detail.php?publicationid=334&language=de; on the situation and the events in the CD see Rebecca Johnson, Fissile Material talks (Fissban), http://www.acronym.org.uk/fissban/index.htm and reports published in the journal Disarmament Diplomacy, online at http://www.acronym.org.uk.

33 Oleg Bukharin, Integration of the Military and Civilian Nuclear-fuel Cycles in Russia, Science & Global Security, Vol. 4, No. 3, p. 385, 1994; Gennady Pshakin, Methods to cope with Material Protection Problems in Russia and CIS: how to draw a line between civilian and military sector, Paper presented at the International Seminar on Fissile Material Security in the CIS, Bonn, 7-8 April 1997.

Reasons for keeping these miscellaneous types of information secrets vary. In respect of the technical properties of warhead components, it is obvious that the reasons are the same as for secrecy on technical details of complete warheads. Warhead components would in principle reveal the same information as complete warheads, and proliferation relevant information must be protected in these cases. But a lot of secrets can hardly be justified with reasons of nonproliferation or security.

As an example, in the U.S. the isotopic composition is classified as long as the material is in warhead component form. As soon as this form is modified, the isotopic composition may be revealed.[34] In contrast, in Russia the isotopic composition of disarmament material remains classified as well. In case this information is revealed, no additional proliferation danger would be created, because it is already generally known that nuclear-weapon possessors prefer a high Pu-239 content for their weapons plutonium and a high U-235 content for their weapons uranium. It is a matter of speculation as to whether the secrecy is simply the result of an untouched tradition. An explanation might be the fear that surprises could be revealed; either that the composition has an embarrassingly low quality, or even the contrary, that plutonium has been further enriched.[35] The isotopics may also reveal information on the production history of the plutonium, for instance, whether it is re-reprocessed, or whether it is simply diluted. Together with other information such as reactor operating times, it may then be possible to deduce even more information, for example, on total quantities of materials produced.

The question remains why this deducible information remains secret. Why should the figures of total quantities of materials not be published? It may be assumed that motives for secrecy on quantities are the same as motives for secrecy on warhead numbers. Fissile material quantities, even more so the breakdowns described at the beginning of this section, would reveal the potential for rearmament. Nevertheless, rough estimates have been collected and

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[34] J.T. Markin, W.D. Stanbro, Policy and technical issues for international safeguards in nuclear-weapon states, in: International Nuclear Safeguards 1994, Proceedings of a Symposium, Vienna, 14-18 March 1994, Vol. II, p. 639. See also: U.S. DoE, RDD-7, footnote 19.

[35] Indications in this direction can be seen in the Tengen smuggling case: In 1994, a smuggled sample of Pu from Russia was detected in Tengen (Germany) that originated in Russia and apparently has been enriched in Pu-239 with centrifuges. Its isotopic composition was: 0,067% Pu-238, 99,75% Pu-239, 0,18% Pu-240, 0,003% Pu-241, 0,0002 Pu-242. Since Russian warheads are said to be constructed in a way that does not take into account later dismantling, it might be assumed that some Russian warheads consist of enriched

published by non-governmental experts.[36] Official and more precise numbers would not principally change the picture, at least in the case of the established nuclear-weapon states. In the case of India, Pakistan, and Israel, the numbers are lower and the estimates less accurate, so that the revelation of such numbers might indeed refine estimates of their nuclear armament potential. Hence, these states probably consider such transparency not to be in their security interests. But similarly, most of the established nuclear-weapon states are not interested in disclosing too many details on their existing fissile material stocks.

Another motive might be the fear that transparency on fissile materials could reveal too many embarrassing details on previous inaccurate accounting. It is likely that in several states with nuclear-weapon complexes, an exact overview of stocks has either been lost or never existed in a sufficiently accurate form. Many plants and deposits are not satisfactorily secure.

A final potential motive for secrecy can be simple conservative inertia. In states with nuclear weapons, the assumption prevails that fissile materials just like nuclear weapons are national property and of no concern to the international community, in contrast to non-nuclear-weapon states who have a tradition of international safeguards on their nuclear-fuel cycles and who are undergoing even more transparency and verification obligations.[37] Regular and comprehensive transparency measures, even when voluntary, might be regarded as a slippery slope towards binding obligations and unwanted verification measures.

In February 1996, following a two-year study, the U.S. DoE published a comprehensive report detailing information about U.S. plutonium production and use from 1944 through 1994.[38] It is a result of the above-mentioned Openness Initiative.[39] A similar report on U.S. HEU production, acquisition, and use has been completed but never published because of the

plutonium. Plutonium of such a low content of higher isotopes has a very slow americium build-up and does not need to be remanufactured. However, enrichment of plutonium is technically very difficult and costly.

36 David Albright et al, footnote 29. For updates, see also the website of the Institute of Science and International Security (ISIS): http://www.isis-online.org; David Wright, Lisbeth Gronlund, Estimating China's Production of Plutonium for Weapons, Science & Global Security, Vol. 11, pp. 61-80, 2003

37 An exception is the civilian nuclear-fuel cycles of Britain and France that are subject to Euratom safeguards.

38 US Department of Energy, Plutonium: The First 50 Years: United States Plutonium Production, Acquisition, and Utilization from 1944 through 1994, DOE/DP-0137, Feb. 1996, http://www.fas.org/sgp/othergov/doe/pu50y.html

39 RDD-7, see footnote 19

complexity of the data being reviewed and for “classification reasons”[40], probably because of secrecy of naval fuel production. In Spring 2000, the British Government published a study providing data on Britain’s stockpiles of nuclear material for the purpose of making its disarmament plutonium accessible for IAEA inspections.[41] Similar data relating to British HEU was not published, probably – like in the U.S. – because this is reserved for nuclear submarines. Nevertheless, the U.S. and British publications on plutonium should be praised as important steps in the right direction. Other nuclear-weapon possessing states lack comparable transparency initiatives. Unfortunately, the U.S. has reversed its policy and is now engaged in reducing its nuclear transparency.

It is not surprising that in discussions on the scope of future FMCT negotiations, none of the nuclear-weapon possessing states except Pakistan[42] is willing to consider the inclusion of fissile materials produced prior to entry into force. This has been demanded by a large number of non-nuclear-weapon states. In discussions on FMCT verification, nuclear-weapon possessing states government officials advocate the so-called "*focused approach*" e.g. a minimalist verification scenario that covers only reprocessing and enrichment facilities but that renounces material accountancy.[43]

Positive steps forward were the negotiations between the U.S., Russia, and the IAEA to submit to verification excess nuclear materials arising from disarmament, the so-called “*trilateral initiative*”. Its task was to work out procedures under which weapon-origin and other fissile materials released in Russia and the U.S. – in classified or unclassified forms – could be submitted to IAEA verification.[44] The parties collaborated over six years. In 2002,

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[40] Kevin O’Neill, Paths to Deep Reductions and Nuclear Disarmament – Status Report on Fissile Materials, in: David Albright and Kevin O’Neill (Ed.), the Challenges of Fissile Material Control, Washington, DC, 1999, p. 41, downloadable at: www.isis-online.org

[41] United Kingdom's Defence Nuclear Programme, Plutonium And Aldermaston – An Historical Account, 2000, in the internet at http://www.mod.uk. For a short critique see William Walker, Plutonium And Aldermaston - An Historical Account, Trust & Verify, No. 92, July 2000.

[42] Munir Akram, Ambassador of Pakistan, Statement on the 'Fissile Material Treaty', 11 August 1998, http://www.acronym.org.uk/fissban/pak.htm. Pakistan at that time wanted to know the quantities of fissile materials that India has produced. It is unclear whether this position is still maintained today as Pakistan has resumed HEU production.

[43] Victor Bragin, John Carlson, and John Hill, Verifying a Fissile Material Production Cut-Off Treaty, Nonproliferation Review 6, no. 1, Fall 1998, http://cns.miis.edu/pubs/npr/vol06/61/bragin61.pdf.

[44] Press Statement on the Trilateral Initiative, IAEA Press Release, PR 97/26, 30 September 1997; Thomas E. Shea, Report on the Trilateral Initiative – IAEA verification of weapon-origin material in the Russian Federation & the United States, IAEA Bulletin, 43/4/2001, http://www.iaea.org/Publications/Magazines/Bulletin/Bull434/article9.pdf, Thomas E. Shea, Potential roles

they completed a draft legal agreement on a framework for IAEA verification of material. It contains provisions for sophisticated technical verification procedures.

In the case of fissile materials in classified forms, it would be submitted in sealed containers. The technical measurements would make use of information barriers. The aim was to create assurance that nuclear material excess to defence needs is identified correctly, while at the same time "sensitive" information is protected. Russia is very secretive on information of its excess nuclear material, as demonstrated by the above-mentioned example of the Russian refusal to reveal the isotopic composition of its weapons plutonium.

In September 2002, IAEA Director General Mohammed ElBaradei announced to the IAEA General Conference that the Trilateral Initiative's "preparatory work" was now "largely concluded."[45] But the Trilateral Initiative was running up against several unresolved disagreements between the parties. The first concerns the parity: The Russian condition was that the U.S. places material of similar quantity and quality under IAEA verification. But the U.S. refuses to put any of its excess plutonium in classified forms under IAEA monitoring, despite different pledges in the past. The second disagreement concerns the duration of the verification. The IAEA has insisted that the verification continues until the material has reached a stage of being "practically irrecoverable for use in weapons". This is the standard IAEA criterion for "termination of safeguards". But Russia intends to use the material in its civilian fuel cycle, and the consequence of the IAEA proposal would be IAEA monitoring of large parts of the Russian civilian fuel cycle. This is not acceptable to Russia, and no agreement has been reached so far. A third unsolved disagreement concerns the costs, whether they are paid only by the owners of the materials, or whether also the international community pays a contribution.

An important benefit of an implementation of the Trilateral Initiative would be irreversibility of disarmament because material once subject to verification could never again be used for nuclear weapons. It also offers a means to determine quantitatively just how much fissile material has been removed from defence programmes. The Trilateral Initiative has the potential to be a starting point for future nuclear disarmament agreements, and for

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for the IAEA in a warhead dismantlement and fissile materials transparency regime, in: Transparency in nuclear warheads and materials, Ed. Nicholas Zarimpas, Oxford University Press, p. 229, SIPRI 2003; see also Nuclear Threat Initiative, IAEA Monitoring of Excess Nuclear Material, http://www.nti.org/e_research/cnwm/monitoring/trilateral.asp incorporating other states with nuclear weapons. It would be a major achievement for nuclear transparency.

In September 2000, the U.S. and Russia concluded an agreement on the disposition of excess weapons plutonium, the “*Plutonium Management and Disposition Agreement*” (PMDA).[46] This agreement focuses mainly on the MOX option. It devotes large sections to the protection of sensitive material. In order to circumvent the declassification of the plutonium isotopics, the agreement regulates how this plutonium may be diluted by up to 12 percent with so-called "blend stock" plutonium, which is of different isotopic composition and from a non-weapon origin. This procedure ensures that no conclusions can be drawn on the original isotopics. But international verification of the disposition process will be more difficult, as the feedstock blurs accurate material accountancy, and the verification process only starts after the blending has taken place.

Declarations of intent to place excess nuclear material from dismantled warheads under international verification have been made on several occasions, at the G8 summit in Moscow 1996[47], in the Guidelines for the Management of Plutonium, which were agreed between the most important plutonium-using states in 1997,[48] and at the NPT Review Conference in May 2000:[49] "We are committed to placing as soon as practicable fissile materials designated by each of us as no longer required for defence purposes under the International Atomic Energy Agency (IAEA) or other relevant international verification." The same has been asked by the EU Council at the NPT Review Conference.[50] The call has also been repeated in several UNGA resolutions, the latest in November 2001.[51]

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45 NTI, note 44

46 Agreement Between The Government Of The United States Of America And The Government Of The Russian Federation Concerning The Management And Disposition Of Plutonium Designated As No Longer Required For Defense Purposes And Related Co-operation, 1 September 2000, text available at: http://www.ransac.org/PrinterFriendly.asp?Doc=pudisp-agree.html

47 Moscow Nuclear Safety and Security Summit Declaration, April 20, 1996, para 25.

48 INFCIRC/549

49 Letter dated 1 May 2000 from the representatives of France, China, Russia, the UK and the US addressed to the President of the 2000 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, http://www.basicint.org/nuclear/NPT/2000revcon/MC3ChairReportMay12.htm

50 Council Common Position of 13 April 2000 relating to the 2000 Review Conference of the Parties to the Treaty on the Non-proliferation of Nuclear Weapons, Official Journal L 097, 19/04/2000 p. 0001 (Document 400X0297), Article 2 (2 i)

51 Resolution 56/24N of the UN General Assembly, 29 November 2001, A path to the total elimination of nuclear weapons

Conclusions

Transparency is an essential prerequisite for progress in nuclear disarmament. In the first years after the end of the Cold War, steps towards nuclear disarmament were visible, and optimism towards more achievements was widespread. And nuclear transparency of some has risen. But for several years, progress has been stalled and reversed. Today, no country possessing nuclear weapons shows any interest in more openness towards the international community. Their secrecy cannot be explained only by needs of nonproliferation and security. In many cases, security reasons are cited as justification, but hardly understandable. Instead the reasons should be looked for elsewhere:

One preliminary explanation is conservative inertia: if mechanisms and incentives for changes are lacking, not much declassification or changes of policy can be expected. Individuals within the system or citizens of the state, who would support more transparency, do not see a way of starting a process in favour of change. They also fear the consequences of trying and prefer to keep their heads down. Declassification is an active act, and poses the risk of revealing too much. Passive non-action has no immediate consequence, and often conservative bureaucracies prefer to keep the status quo. The classification system does not provide any procedure for declassifying information. Sometimes this reflects a wider characteristic of the possessor state, but sometimes it is specific only to the nuclear complex. Politicians, dependent on the advice of experts, often err on the side of caution when considering whether to declassify nuclear information.

Secrecy is principally an undemocratic attitude. Secrecy within a society reduces the number of decision makers and excludes others from taking part. Cohen and Graham criticise the nuclear secrecy of Israel claiming that its nuclear complex escapes any democratic control and developing suggestions of how to end the extreme secrecy.[52]

The less democratic a state is, the more the opacity can be used as a convenient cover for the evasion of uncomfortable criticism. Such criticism can emanate from citizens of the possessor state as well as from outside. The secrecy can also serve as a cover for mismanagement,

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[52] "An NPT for Non-Members", Avner Cohen and Thomas Graham Jr., Bulletin of the Atomic Scientists, May/June 2004.

crime, or corruption. Furthermore, secrecy may be abused by certain constituencies to set agendas that serve their special interests, for instance to preserve autonomy in decision-making, to maximise their power-through-knowledge, and to avoid scrutiny by competitors or publics. Although each state has its own means of combating corruption and mismanagement, they do not always prove very effective. The more democratic a state is, the more legal limits are set against the abuse of secrecy. Bureaucracies that have always had the traditional "right" to manage national security issues with limited external control have little incentive to change. Moreover, the leverage for more transparency from outside is limited in those states. Even in democracies in which parliamentary control over military activities has been traditionally weak or limited, there is no proper basis for external transparency.[53]

More nuclear transparency is unlikely to occur without incentives. In the past, the incentives for transparency were arms control and disarmament projects. Today, similar incentives are unlikely, and disappointment and frustration are rising. Motivation of the nuclear-weapon states for more transparency coincides with motivation for more nuclear disarmament. The non-nuclear-weapon states have an obligation not to give up in urging them to meet their obligations under Article VI of the NPT.

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[53] Camille Grand, Nuclear-weapon States and the Security Dilemma, in: Transparency in nuclear warheads and materials, Ed. Nicholas Zarimpas, Oxford University Press, p. 32, SIPRI 2003

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