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Mutual Reciprocal Inspections: Issues Regarding Next Steps

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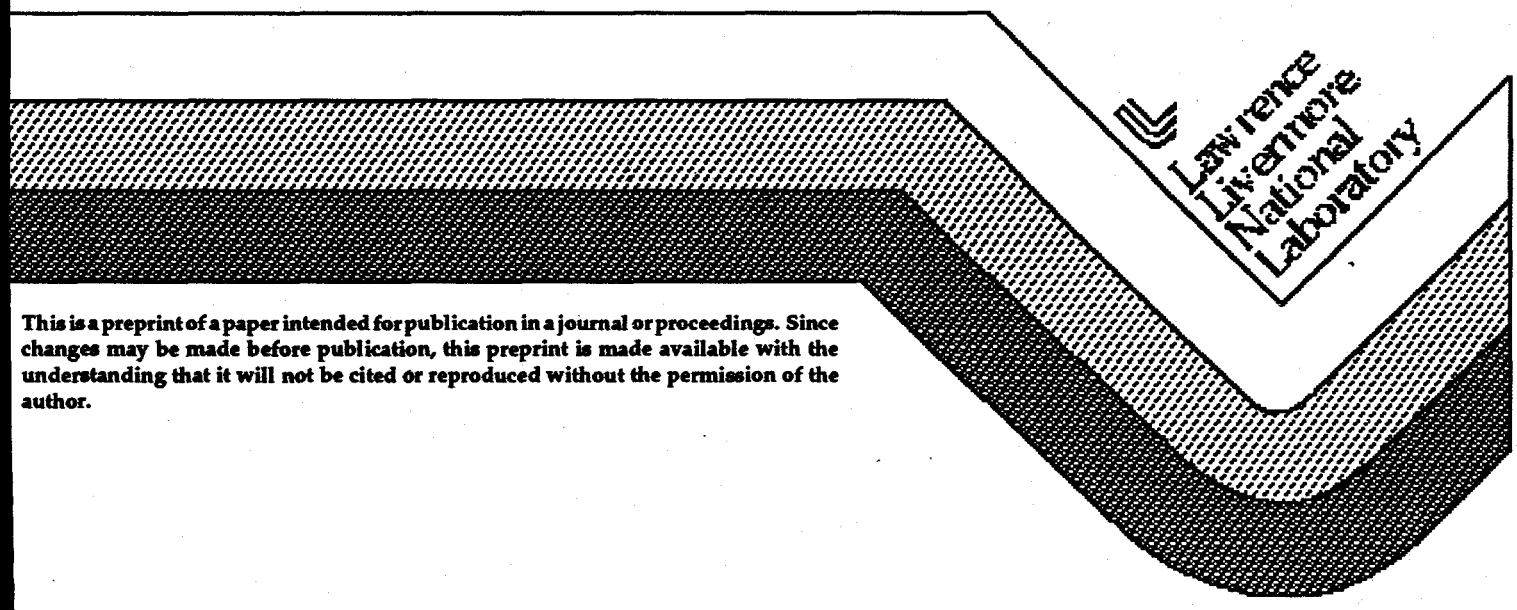

Mutual Reciprocal Inspections: Issues Regarding Next Steps

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Pressures are mounting for a regime to verify the dismantlement of US and Russian warheads, as well as a system of international control over the weapons' fissile materials to assure irreversibility. There are at least four motivating factors for these measures:

- As the United States and Russia lower their numbers of nuclear weapons, each side seeks assurance that the warheads are actually being dismantled.
- By accounting for the fissile materials and placing them under effective controls, the potential for smuggling and theft is reduced.
- A fissile materials cutoff[1] is being discussed at the Conference on Disarmament in Geneva. Verification of a US-Russian cutoff, as well as substantial reductions in fissile materials stockpiles, are seen as integral to the cutoff.[2]
- Calls for total nuclear disarmament have greatly increased.[3] Dismantlement verification and international control of fissile materials are widely viewed as requisite steps toward this goal.[4]

There are many questions to be answered before the United States can agree to a warhead verification regime and international control over excess fissile materials, let alone total nuclear disarmament. Two of the most important are: What are the prospects for effective verification? and How much fissile material can be declared as excess, and possibly be given over to international control? These topics—compliance weaknesses and excess materials—are the focus of this paper.

Compliance Weaknesses

As nuclear weapons stockpiles are drawn down, the United States would like to know with high confidence that its own dismantlement activities are being matched by Russia. Verification is so very important because as stockpiles are lowered, the advantage accruing to the nation with the most warheads increases.

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Thus, if it is easy for Russia to not truly dismantle, to keep hidden stockpiles, or to generate weapons to replace those it dismantles, then the United States may not be so secure. In fact, it may be less secure than if there were no inspections of dismantlement because MRIs could yield a false sense of security and complacency.

Inspections can provide fair assurance that dismantlement has occurred, but they cannot assure balance between US and Russian stockpiles or fissile materials production capabilities. In this regard, MRIs share the problems with verification and compliance that have forced past arms control initiatives to focus on delivery systems rather than warheads. Essentially, the problem is that there are no sure means to detect hidden stockpiles of weapons or fissile materials, nor are there reliable means to detect hidden fissile materials production capability. These problems are complicated by the continuing existence in Russia of commercial plutonium reprocessing and uranium enrichment, either of which could rapidly be converted to weapons purposes. Thus, it is conceivable that the United States might be placed in a situation whereby both countries are dismantling warheads, but only the US stockpiles of warheads and/or materials are actually diminishing.

Undeclared Stockpiles

Russia may not declare all of the nuclear weapons in its stockpile. There are no national technical means to locate hidden nuclear weapons. Discovery would depend on serendipity. The wide range of error possible in estimating Russian warhead inventories was highlighted in 1993, when Minatom director Viktor Mikhailov stated that the Russian arsenal peaked at 45,000 warheads in the mid 1980s—12,000 more than generally believed.[5]

Detection is equally if not more problematic with undeclared fissile materials. There are presently no technical means to enable the United States to ascertain how much fissile material Russia actually has. Even with anytime-anywhere inspections, it could be impossible to find materials not only because there is no way to pinpoint where to look, but also because materials could readily be transported secretly.

Estimates of materials stockpiles could be based on plutonium or HEU production capability and operation records, but discrepancies would be difficult to resolve and uncertainties could be significant. For example, Russian plutonium production has been estimated to be 145 tonnes. A 20% error—25 tonnes—could correspond to primary fuel for as many as 5000 warheads.[6]

Estimates of fissile materials stockpiles may be further complicated by the usability of fissile materials other than HEU or plutonium in weapons. It is possible that Russia has produced, weaponized, and stockpiled these other materials.

Undeclared Production Facilities

Secret plutonium production reactors and reprocessing facilities can be constructed underground or in a mountainside, with emissions eliminated or significantly minimized, and with no observable features to attract attention. Uranium enrichment plants can be hidden even more easily. The ease of hiding varies with the type of technology used. A 20,000 kg-SWU per year centrifuge plant would fit within a typical factory building and would consume only 600 kW electrical power.[7] The power consumption of a plant using laser isotope separation would be a factor of three smaller. Laser as well as chemical isotope enrichment processes can also be used to separate plutonium-239 from reprocessed spent reactor fuel.[8] The technologies to produce fissile materials other than plutonium-239 and uranium-235 are even easier to hide.

The difficulties of finding hidden production facilities are highlighted by the cases of Iraq and North Korea. Despite anytime-anywhere inspections in Iraq by UN experts, it was very difficult to eliminate the possibility that an underground production reactor existed. Only because Iraq is very arid and there are essentially only two sources of water were the inspectors able finally to conclude that the possibility of such a reactor is remote. And, in North Korea, there is speculation among experts that P'yongyang has moved its nuclear weapons production effort underground into the vast network of tunnels in that country.

The International Atomic Energy Agency (IAEA), which is responsible for assuring the use of nuclear technology for peaceful purposes only, has acknowledged that there currently are no technical tools enabling detection of clandestine weapons activities when they take place at undeclared facilities. The IAEA has noted that the problems of finding hidden plutonium reprocessing are greatly complicated in countries where openly acknowledged reprocessing has already occurred. This conclusion is echoed in the JASON Report of 1993, which stated that a determined and highly disciplined evader could undertake clandestine production of weapons or special nuclear materials without being detected by national technical means. Only real world lapses of discipline would leave traces of sizable activity that would be detectable.[9]

Relabeling Commercial Materials

As yet, Russia will not need to have either hidden stockpiles or secret facilities to produce fissile materials should it wish to cheat on warhead dismantlement obligations. Instead, it can rely on existing capabilities to break out. Russia has three commercial reactors—two at Tomsk and one at Krasnoyarsk—that produce approximately 1.5 tons/year of plutonium. For safety purposes, Russia has stated that the fuel must be reprocessed.[10] Thus, there are not only stockpiles of "civilian" plutonium that could rapidly be relabeled "military," there are the facilities themselves which are on-line and available to make more plutonium.

In March, 1994, Russia announced with fanfare that it would shut down its three nuclear reactors still producing plutonium. The caveats to this statement were that alternative sources of energy must first come on line and that funding for those sources must be found. Although there are ongoing, productive talks on changing the core of the reactors, this has not yet been achieved, so Russia continues to reprocess the spent fuel.

Russia also has extensive capabilities for HEU production. Its four large gas centrifuge enrichment facilities could be converted from their current low-enrichment configuration. This activity would probably be observed, but with too little lead time to affect the militarily significant consequences of production breakout.

Other Verification Concerns

A different sort of verification difficulty is posed by the prospect of placing fissile materials under international control, or even under inspection by the International Atomic Energy Agency (IAEA). Either option will require that the materials not be in weapons form, which may introduce substantial costs, time delays, and storage problems. Cost is a particularly pertinent issue because the IAEA is already severely underfunded for its expanding responsibilities in safeguarding materials and facilities in states of the former Soviet Union and in potential proliferant states.

Future Threats—The Key to Defining *Excess*

A key issue in a warhead dismantlement verification regime is how much material to declare as excess and placed under inspections, or, perhaps, international control. Some people in the US and Russian defense communities may be tempted to look upon excess fissile materials as ultimately retrievable. After all, if the fissile material stays in one's own country and inspectors can be halted at the border in a crisis, would it not be possible to tap those resources in a crisis? This very possibility is behind the strong insistence in the international arms control community to assure that materials, once placed under control and inspection, will not be allowed to revert to weapons purposes. It is likely that the international community, either as part of fulfilling NPT obligations or as part of a fissile materials cutoff convention, will demand that US and Russian excess materials be placed under some sort of international control and accounting to further guarantee irreversibility. Thus it is imperative that the United States determine carefully the quantity that it is willing to declare as excess.

There is no question more central to defining what fissile materials are "excess" than "What are the likely future threats?" Knowing what threats must be deterred enables a reasonable judgment of what the stockpile needs are. In the past, and to some extent in the present, threat analysts have sought to determine

materials stockpile needs on the basis of the menace posed by the Russian nuclear forces. To the extent that the focus of our single opponent could be drawn down, so could our own forces be reduced. Unfortunately, the threat situation has become much more complex in the 1990s, and the Russian threat not the only one for which the stockpile must be designed. Thus, the definition of what constitutes excess materials must take into account new threats.

Since 1991, there has been a sea change in the nature of threats posed in three respects—the growth of capabilities of secondary nuclear powers, the emergence of radical nuclear proliferants, and the spread of chemical and biological arsenals. Each of these phenomena should affect the planning for the stockpile and influence the quantities of materials declared excess.

Secondary Nuclear Powers

China has not been a highly salient threat to the United States, principally because China had few warheads and delivery systems relative to those of the United States. Now, however, the Chinese arsenal is growing in size and sophistication, while that of the United States is declining in size and is no longer being modernized. Although China's arsenal is not likely to ever pose the degree of threat as does Russia's, it must be considered more seriously in US planning than in the past. Worst-case scenario planning must include the possibility that Chinese forces could be allied with those of Russia, or possibly of other nuclear powers in the future.

China is estimated to have 300-400 nuclear warheads and is making progress on miniaturization and reliability through its continuing nuclear tests.[11] It is also working on mirving. In this, it is reported to have received help from scientists recruited from Russia.[12] It may also have obtained help from Ukraine in SS-25 mobile missile development.[13] China has been developing the JL-2 SLBM with a range of about 5000 mi and the DF-41, with a range of more than 7000 mi.[14] China will not only have the ability to deter US involvement in regional affairs, but can also directly threaten the US mainland.

US-China relations have been increasingly contentious in the 1990s, with disputes ranging across issues from human rights to China's assistance to nuclear, chemical, and missile proliferants. These issues are not likely to result in confrontation, in the view of most experts. Rather, any hostilities are likely to result from China's growing insistence that its preeminence in the region be recognized and the role of the United States in regional affairs be minimized. Most recently, this has been exemplified by China's sharp reaction to what it views as breakaway attempts by its "province," Taiwan. If China continues to exercise its will with virtual impunity, the potential for US-Chinese hostilities is likely to increase.

India has had nuclear explosives capabilities since its 1974 test and has steadily been producing fissile materials since. Some estimates say that India could have more than 200 nuclear warheads.[15] India has also developed impressive ballistic missile delivery capability. India's Agni missile can carry a 1000 kg payload to a range of 2500 km. It successfully tested a low-earth and a polar satellite launch vehicle (SLV), the latter of which could be used as an ICBM with a 1000 kg payload. India has also developed cruise missiles.[16]

The potential for confrontation between the United States and India is very low at present, but this could change. It is possible, for example, that a Hindu-nationalist party could come to power in India and become more belligerent vis-a-vis Pakistan on a variety of issues, including Kashmir. If Pakistan were unjustly at risk and the United States were to show support by sending naval power into the Indian Ocean, India is likely to view it as nuclear provocation—much like it did when the *USS Enterprise* was sent to the region in support of Pakistan in 1971. India's response might be to threaten use of its own nuclear weapons.

Hostile Proliferants

In the past two decades, countries that have acquired nuclear weapons have not had either the will or the capability to threaten the United States. Thus, we are thus not used to thinking about applying US nuclear weapons to non-traditional threats. Since 1990, however, the situation has changed significantly. There may now be near-term threats from proliferants against which the US nuclear arsenal must be applied.

Iraq surprised the United States with its advanced nuclear weapons program and its intermediate range Scud missile derivatives. Iraqi scientists were well on the way to having a workable nuclear weapons design and highly enriched uranium for one or more nuclear weapons within 18 months.[17] With the end of the 1991 war, the United Nations was commissioned to destroy Iraq's weapons of mass destruction and longer range missile capabilities. This effort has been extensive, costly, and has had some successes. Yet, Iraq has also preserved as much of its missile and nuclear technologies as it could, and has continued to acquire and stockpile key items—such as specialized magnets for uranium enrichment centrifuges from China—that it will need to resuscitate its weapons programs once the UN inspections flag or end.

The United Nations issued a report in October, 1995, which described Iraq's continuing ballistic missile program. Despite UN inspections and sanctions, Iraq secretly has imported key technologies useful in missile guidance and construction. Furthermore, Iraq admitted for the first time that it had made significant strides in missile development, including development and testing of a new liquid propellant engine and development and successful testing of a warhead separation system.

There is no question that Iraq currently plans to revive its missile and weapons of mass destruction programs in the future. And, it is a good bet that Iraq hopes to seek revenge against the United States.

North Korea is another threat against which the United States should be prepared. North Korea secretly separated plutonium for nuclear weapons, and still retains that fissile material despite its agreement to halt its nuclear program in return for commercials reactors, fuel oil, and infrastructure projects. Furthermore, North Korea may have undeclared plutonium production facilities out of view in one of its myriad tunnels or underground facilities.

The nuclear threat posed by North Korea to South Korea and the United States is made more serious by the fact that North Korea also has nuclear-capable Scud missiles that can reach Seoul and other cities of South Korea readily. North Korea has developed a missile based on the Scud, the Nodong 1, a missile with a range of 1000 to 1300 km. North Korea also is developing longer range missiles, the Taepodong 1 and Taepodong 2. The former is estimated to have a range of 2000 km and may be operational this year. The latter has been estimated to have a range up to 10,000 km, making it capable of reaching the United States, and could be operational by the year 2000.

Chemical and Biological Threats

North Korea has chemical and biological[18] weapons (CBW). Also, it has the capability to make CBW warheads for its ballistic missiles, and is reportedly developing cruise missiles as well.

Iraq produced and used chemical weapons extensively in its war with Iran and may retain chemical stocks. It certainly has the technical capability to produce more chemical weapons. Similarly, it has produced, and still may retain, several types of biological agents. It successfully tested biological delivery systems and deployed biological agents in bombs, missiles, and aircraft tankers.

Because chemical and biological programs are easy to hide successfully, and are relatively inexpensive and easy, many nations may have them. This is true despite international treaties banning possession of BW and use of CW.

A key question facing the United States, which has forsworn both BW and CW, is what weapons systems it will use to deter CBW threats from others. Conventional weapons may work in some scenarios, but have serious limitations in others. Nuclear weapons are likely to be more effective deterrents in some scenarios, but US policy appears to preclude this. Specifically, the United States rules out use of nuclear weapons against non-nuclear weapons states not allied with a nuclear weapon states. Thus, a CBW armed state with no nuclear

weapons is not to be threatened with or deterred by US nuclear weapons according to US declaratory policy.

In the future, US policy will certainly have to be reevaluated if CBW are used against US forces or allies. Nuclear weapons are known to have deterred Saddam Hussein's use of CBW during Desert Storm.[19]

Conclusion

If nuclear weapons are to be used in the future to deter secondary nuclear powers, potential hostile proliferants, and/or CBW threats, US planning must take into consideration how much fissile material should be reserved for these tasks. At the same time, US planning must account for the worst-case scenario that dismantlement verification and fissile material safeguarding fail to prevent Russian possession or buildup of clandestine nuclear forces.

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[1]Its original purpose of capping the SNM production in India, Israel, and Pakistan has evolved to include the objective of reducing nuclear weapons states' SNM stockpiles.

[2]The Joint Statement on Inspection of Facilities Containing Fissile Materials Removed From Nuclear Weapons, issued by the US and Russian Governments on March 16, 1994 stated, "These inspections will be an important step in the process of establishing a worldwide control regime for fissile materials."

[3]India, for example, is insisting on a time-bound framework for total nuclear disarmament as a condition for its participation in a comprehensive test ban. Also, the "principles and objectives" agreed to at the 1995 Nuclear Nonproliferation Treaty conference embody the zero nuclear weapons objective.

[4]The expectations and preferences for next steps in international arms control were made clear by academic and government representatives at a recent Carnegie Endowment conference on proliferation and arms control held February 12-13, 1996. Speakers from around the world focused on what the arms control agenda should be in the near term, with virtually all calling for total nuclear disarmament. Many urged that the next steps be conclusion of a verification regime for US and Russian dismantled warheads, along with a process for turning special nuclear materials (SNM) over to international control to assure irreversibility. This was conveyed most clearly perhaps by noted arms control expert Lewis Dunn, who called for declarations and registering of nuclear arsenals as well as international control over fissile materials as means to achieve "nuclear entropy."

[5]William J. Broad, "Russian Says Soviet Atom Arsenal Was Larger Than West Estimated," *The New York Times*, September 26, 1993, p. 1.

[6]Sidney Drell, et al, "Verification of Dismantlement of Nuclear Warheads and Controls on Nuclear Materials," Study for the US Department of Defense, January 12, 1993, p. 54.

[7]Sidney Drell, et al, p. 77

[8]For example, pure metallic plutonium can be recovered from low-exposure spent fuel using a pyrochemical process (electro-refining) in a sealed, shielded cell using a cover gas of pure argon. With this method, 20 kg of plutonium could be separated from 3 tons of irradiated uranium per year in a cell 60 x 60 x30 m. There would be no emissions. The Kr, Xe, and Rn gases would be cryogenically trapped from the argon atmosphere and stored in steel containers. This example was provided to the author by Melvin S. Coops of Lawrence Livermore National Laboratory.

[9]Sidney Drell, et al, "Verification of Dismantlement of Nuclear Warheads and Controls on Nuclear Materials," Study for the US Department of Defense, January 12, 1993, p. 4

[10]The fuel must be reprocessed, Russian officials say, because its aluminum cladding does not withstand long-term storage safely and there are space limitations for fuel storage.

[11]Publicly available data on the size of the Chinese arsenal vary vastly. Some estimates exceed 1200 warheads. See, for example, Chao Yun-Shan, "Communist China's Nuclear Might: How Many Bombs?" *Pai Hsing* (Hong Kong), August 1, 1992, pp 26-31, Translated in FBIS

[12]John Fialka, "US Fears China's Success in Skimming Cream of Weapons Experts From Russia," *The Wall Street Journal*, October 14, 1993, p. 12.

[13]Patrick E. Tyler, "China Upgrades Nuclear Arsenal As It Re-examines Guns vs Butter," *The New York Times*, October 26, 1994, p. A1.

[14]These data were released by Senator Larry Pressler. See Bill Gertz and Martin Sieff, "China's Weapons Plan Threatens US, Senator Says," *The Washington Times*, May 5, 1994. p. 12.

[15]Barbara Crossette, "India Is Pressed on Atom Project," *The New York Times*, February 12, 1992, p. 12.

[16]Mark Hewish, "India Develops Its Own Cruise Missile," *New Scientist*, August 4, 1983, p. 327.

[17]Some estimates say that Iraq was a few years from having sufficient fissile materials. The 18 months is the low estimate given by some of the nuclear weapons experts who served as United Nations inspectors in Iraq.

[18]North Korea has worked on a variety of biological agents, including anthrax, cholera, plague, and smallpox. See Yvgeny Primakov, "Russian Intelligence Report on Proliferation," *JPRS Report* translation February 24, 1993, p. 62.

[19]Iraqi Deputy Prime Minister Tariq Azziz told UN Special Commission on Iraq Ambassador Rolf Ekeus that Iraq did not use chemical or biological weapons because Secretary of State James Baker had delivered a threat on January 9, 1991, that any use of unconventional warfare would provoke devastating response. Tariq Azziz conveyed the message to Saddam Hussein. The Iraqi leadership, according to Azziz, interpreted the threat as being one of nuclear retaliation. R. Jeffrey Smith, "UN Says Iraqis Prepared Germ Weapons in Gulf War," *The Washington Post*, August 26, 1995.

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