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GENERAL REPORT
SAFEGUARDING THE NUCLEAR COMPLEX IN RUSSIA AND THE NEWLY INDEPENDENT STATES

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I. INTRODUCTION

1. Reducing Russia's nuclear stockpile and maintaining its security has been one of the most challenging undertakings of the post-Cold War period. Until 1991, the Soviet Union had produced over 40,000 nuclear weapons and quantities of fissile material (highly enriched uranium and plutonium) that could be used to produce at least 40,000 more nuclear warheads. Over the past decade, arms control and co-operative security agreements between the United States and the countries of the former Soviet Union have

substantially reduced that enormous arsenal. These initiatives have also succeeded in eliminating all nuclear weapons left in Newly Independent States (NIS) such as Belarus, Kazakhstan and Ukraine.

2. According to recent estimates, Russia - which is dismantling about 2,000 warheads annually - has about 10,000 active nuclear weapons and as many retired or non-deployed warheads awaiting dismantlement. The quantities of fissile material have been estimated at up to 1,365 tons of highly enriched uranium (HEU) and 156 tons of plutonium. Small quantities of fissile material also remain in Belarus, Kazakhstan, Latvia, Ukraine and Uzbekistan.
3. Despite considerable efforts, mainly by the United States, to protect, secure and dispose of weapons and weapons-usable material, much remains to be done to address the problems of the former Soviet nuclear military complex. The economic and financial situation of the Russian Federation increases risks. The country cannot afford to protect adequately some of its nuclear sites and laboratories, nor to pay regularly all the employees and scientists in its huge complex. Breakdowns in military command structures have included units that control weapons or fissile material. Therefore the threat of diversion of nuclear weapons materials, by either insiders or outsiders, is a reality. Although in the last ten years no nuclear weapons or significant quantity of fissile material have been successfully stolen or smuggled, many attempts to do so have been prevented by Russian and international police operations.
4. Serious security concerns stem also from the state of Russia's nuclear submarines. Risks of proliferation of either missile technology or fresh and spent submarine fuel (containing HEU or plutonium) are extremely high, considering the poor security conditions. Accidents like the one involving the *Kursk* in August 2000 can occur again, with serious environmental consequences.
5. The Science and Technology Committee addressed the problem of protecting, securing and dismantling the Soviet nuclear arsenal in several reports and meetings from 1992 to 1995. Ten years after the dissolution of the Soviet Union, however, many dangers and challenges posed by that formidable nuclear arsenal remain unsolved. This report will try to describe briefly the state and the security of Russian nuclear weapons. Particular attention will be devoted to fissile material security in Russia and the NIS, including an analysis of the most serious efforts to steal or divert these materials. We will also try to assess the most important Western co-operation and non-proliferation initiatives dealing with these problems in Russia and the NIS. Finally, we will offer a few policy recommendations with a view to making these initiatives more effective.
6. We believe that both the United States and Russia, as the world's major nuclear powers, have a responsibility to examine and address this major security threat, within their own financial ability and in accordance with their mutual disarmament commitments. With regard to its international dimension, the threat should also be

properly addressed in the context of multilateral non-proliferation initiatives. Other NATO allies may assume a bigger share of the costs of initiatives that will enhance their security as well.

II. RUSSIAN NUCLEAR FORCES

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7. Under the Strategic Arms Reduction Treaties (START), Russia and the United States have undertaken to make phased reductions in their strategic offensive nuclear forces. START I was signed by the Soviet Union and the United States in 1991 and entered into force in 1994. Russia, Belarus, Kazakhstan and Ukraine assumed the Soviet Union's obligations under the treaty. The final limits of START I, to be met by each side before the end of 2001, are:
    - 1,600 strategic nuclear delivery vehicles, i.e. intercontinental ballistic missiles (ICBMs), submarine-launched ballistic missiles (SLBMs) and heavy bombers;
    - 6,000 accountable warheads on these systems, of which no more than 4,900 may be on ballistic missiles;
    - ballistic throw weight (lifting power) limited to 3,600 tons.
8. START II, signed in January 1993 by Russia and the United States, was ratified three years later by the US Senate, and only in April 2000 by the Russian Duma which had long criticised it for its allegedly unfair impact on the country's strategic posture and defence budget. The basic terms of the treaty establish that, by 31 December 2007, each side is to deploy no more than 3,000-3,500 strategic nuclear warheads on ICBMs, SLBMs and heavy bombers. Also, by the end of 2003, both sides are to deactivate all strategic nuclear delivery vehicles to be eliminated under the treaty (a deactivation agreement was codified in 1997). Additional limits were included in START II, such as no multiple warheads may be deployed on land based missiles and no more than 1,700-1,750 warheads may be deployed on SLBMs.
9. In 1997, Presidents Clinton and Yeltsin reached an agreement in Helsinki on the framework of a START III that would mandate further cuts in their strategic forces. The new treaty would reduce strategic nuclear warheads to 2,000-2,500 for each of the parties. In bilateral talks that started after the Duma's START II ratification, Russia reportedly suggested bringing the START III warhead ceiling down to 1,500 or less. Deeper reductions became increasingly attractive in the Russian parliament because of the growing realization that a rapid downsizing of their strategic nuclear forces was almost unavoidable given the chronic budget shortfalls. In fact, Russian nuclear forces will probably decline well below the START II limits by 2010 because of the ICBMs, SLBMs and heavy bombers reaching the end of their service lives.
10. In the following paragraphs we will try to quantify current Russian nuclear forces. According to the Carnegie Endowment for

International Peace (CEIP), there are several different ways to do this. For instance, the Memoranda of Understanding (MOU) provided under START I define "deployed weapons" as the total number of strategic launch vehicles deployed even if warheads have been removed or the launchers are simply awaiting dismantlement. Because of this, START I MOU figures for nuclear forces are normally higher than actual operational numbers. These rules of account were changed in START II, which established "real" account. Most analysts define "deployed weapons" as only those delivery vehicles that are operational and armed with nuclear warheads. In this report (and in the table in Appendix A), we have adopted the latter definition.

A. INTERCONTINENTAL BALLISTIC MISSILES (ICBMs)

11. The Russian ICBM force is the stronghold of the Russian strategic forces. ICBM forces are operated by the Strategic Rocket Forces (SRF), a separate armed service of the Russian military, the commander of which is Colonel-General Nikolai Solovtsov.
12. Russia has currently deployed five different types of ICBMs with a range greater than 5,500 kilometres. SS-18s (NATO designation: *Satan*) and SS-19s (*Stiletto*), first deployed in 1975, both carry multiple independently targetable re-entry vehicles (MIRV). START I requires Russia to retain only 154 SS-18s from the original 204, all of which should be eliminated under START II. Also, 105 single warhead SS-19s may be retained by Moscow under START II from the original 170. In July 2000, Russia had 180 SS-18s and 150 SS-19s deployed.
13. The SS-24s (*Scalpel*) and SS-25s (*Sickle*) constitute the latest generation of Russian ICBMs. All of the 46 SS-24s, the last MIRVed ICBMs built by Moscow - 36 of which are rail-based and already considered non-operational - should be eliminated under START II. To replace MIRVed ICBMs, Russia will rely on single-warhead SS-25s and on a new variant of the latter, the SS-27 or Topol-M, which is currently the only Russian strategic weapon still in production. Topol-Ms were first put on "trial service" in 1997, then ten of them were deployed in 1998, ten others in 1999, and four more in 2000. In 1998, General Yakovlev, former commander of SRF, announced that Russia planned to make 20-30 SS-27s operational each year for the next three years, and 30-40 for the three years after that. For obvious economic reasons, these schedules are not being met. According to the *Bulletin of the Atomic Scientists*, "a more realistic rate of production is 10-15 missiles a year, with perhaps some 60-80 fielded by the end of 2005".
14. The deactivation and retirement of Russian ICBMs and launchers consists of four stages: (1) removal from alert status by electrical and mechanical procedures; (2) removal of warheads from the missile; (3) withdrawal of the missile from the silo; and (4) destruction of the silo.

B. NUCLEAR-POWERED BALLISTIC MISSILE SUBMARINES (SSBNs)

15. The future of Russia's SSBNs - once the largest SSBN fleet in the world - is very much in doubt. Almost two-thirds of the submarines have been withdrawn from operational service and most of the current fleet is in or nearing retirement. The effective lifetime of an average Russian nuclear-powered submarine is approximately 20 years.
16. Officially, 17 SSBNs of three different classes are operational: seven Delta IIIs, seven Delta IVs and three Typhoons. They are equipped with three different types of SLBMs, all MIRVed. According to Russian sources, however, two Typhoons are "unfit for combat" and the third was already withdrawn in 1998. Nonetheless, in November 1999 the Russian navy fired two ballistic missiles from a Typhoon-class submarine in the Barents Sea, reportedly hitting targets 4,900 kilometres away on the Kamchatka Peninsula. Other test launches were performed by two different Delta IV submarines in March and December 2000. According to press reports, the navy currently maintains one SSBM on patrol in the Atlantic and one in the Pacific, with at least one more in each fleet on pier-side alert. In 1996, Russia had laid the keel of the first new Borey-class SSBN, but construction was suspended in 1998 and it is unlikely that any of these submarines will join the fleet in the next four years.

C. BOMBERS

17. Two types of Russian aircraft carry air-launched cruise missiles (ALCMs) armed with nuclear weapons. Tu-95 *Bear* bombers have two variants, H6 and H16 (indicating the number of ALCMs they can respectively carry), and are deployed in two different locations. In 2000, the number of Tu-160 *Blackjack* bombers deployed in the Russian Air Force rose from six to 15. An aircraft company of the Tupolev group delivered one new-construction Tu-160 in May 2000 and Ukraine sent eight more back to Russia.
18. In early 2000, Ukraine transferred three *Bears*, eight *Blackjacks* and 575 cruise missiles to Russia as payment for part of its debt for Russian natural gas. The 21 *Bear* and nine *Blackjack* bombers remaining in Ukraine have now been eliminated with US assistance.

D. NON-STRATEGIC FORCES

19. The composition and number of Russian non-strategic (or tactical) nuclear forces are extremely difficult to assess. They are not subject to any arms control agreement but only to non-binding unilateral, parallel declarations made by former Presidents George H. W. Bush and Mikhaïl Gorbachev in 1991 and reiterated by former President Yeltsin in 1992. Although these declarations appear to have been largely observed (and thousands of tactical

nuclear weapons have been eliminated), they are not legally binding and do not provide for data exchanges nor for verification mechanisms. Some information, however, has been exchanged at meetings of the NATO-Russia Permanent Joint Council (PJC). Moreover, the 1997 Helsinki framework agreement for START III allowed for the exploration of measures relating to tactical nuclear weapons.

20. Non-strategic forces include surface-to-air missiles, and warheads from ships, submarines, and aircraft. These are relatively small, short-range systems designed for use in battlefield or theatre-level operations. According to different estimates, a rough total of between 3,500 and 4,000 non-strategic nuclear weapons are still deployed by Moscow.
21. The fact that tactical nuclear weapons are not subject to any binding arms control agreement is not the only reason for concern. In fact, as many analysts have pointed out, their characteristics make this class of nuclear weaponry more susceptible to theft and accidental or unauthorised use. Their small size and the absence among older generations of electronic locks or other state-of-the-art control devices contribute to their vulnerability. Moreover, the modes of their basing and prescribed use pose major problems in terms of their physical and political control. As Russia reduces its strategic nuclear arsenal, defence planners are already exerting greater pressure on the government to turn to tactical nuclear weapons for increased military flexibility.

E. DOWNSIZING THE SOVIET NUCLEAR ARSENAL

22. The United States and Russia have undertaken the destruction of strategic nuclear weapons in the countries of the former Soviet Union, under the Cooperative Threat Reduction (CTR) programme (also called "Nunn-Lugar" after the two senators who co-sponsored it), established by the Soviet Nuclear Threat Reduction Act of 1991. Begun under the administrative auspices of the US Department of Defense (DOD), the original CTR programme's main objectives included: (1) transporting nuclear warheads from the Soviet successor states to Russia; (2) destroying and dismantling weapons systems; (3) ensuring custodial safety of the former Soviet nuclear material; (4) assisting the destruction of chemical and biological weapons; and (5) supporting demilitarisation. Since 1993, the programme has evolved to encompass a wider range of non-proliferation and demilitarisation activities across the former Soviet Union, involving the DOD, the Department of Energy (DOE) and other governmental agencies.
23. During the first five years, the CTR programme primarily concentrated on transferring strategic nuclear weapons from Belarus, Kazakhstan and Ukraine to Russia (task successfully completed in 1996, avoiding the emergence of three new nuclear weapon states), and putting in place an organisational structure. In the period between 1996 and the present, the programme attained considerable success in assisting the dismantling of Russian

nuclear weapons and improving significantly the security of such weapons and materials. Overall, from 1992 to 1999, the United States has obligated $2.7 billion to CTR initiatives in the former Soviet Union, $1.7 billion of which went to efforts in Russia. Up to the end of 1999, the US Congress authorised some $3 billion for CTR programmes as part of the Clinton Administration's Expanded Threat Reduction Initiative (ETRI), which proposes to spend $4.5 billion more by 2005.

24. According to the US Defense Threat Reduction Agency (DTRA), as of 15 February 2001, CTR programmes had helped deactivate 5,336 nuclear warheads, destroy 422 long-range ballistic missiles, eliminate 367 ICBM silos, seal 193 nuclear test tunnels, eliminate 83 bombers, destroyed 425 long-range nuclear ALCMs, eliminate 184 SLBMs, and dismantle 18 SSBNs. The June 2001 *Nuclear Status Report*, a study by the Non-Proliferation Project of CEIP and the Center for Non-proliferation Studies of the Monterey Institute of International Studies, estimated that by 2010 Russia's strategic nuclear arsenal may drop to 1,000 weapons or less as aging systems are retired with US assistance.
25. Under the Strategic Offensive Arms Elimination (SOAE) programme, where most CTR funds had been obligated, the DOD has provided training, logistics, facility construction and US-made equipment for eliminating ICBMs and associated launch facilities, SLBMs and their submarine launchers, and bombers, as well as for transporting and disposing of toxic liquid fuel for rocket engines. The SOAE and the complementary nuclear Weapons Protection, Control and Accounting (WPC&A) project are making good progress in meeting their goals. There are, however, areas where the projects in both Russia and Ukraine are meeting delays and bureaucratic difficulties.
26. According to most analysts, the level of physical protection at Russian nuclear weapon storage sites raises increasing concern. The old Soviet security systems seem no longer adequate under the new conditions in Russia. However, because of the level of secrecy imposed on all issues pertaining to nuclear weapons in Russia, it is extremely difficult to assess the actual security conditions. All indications are that, despite the substantive improvements produced by CTR programmes, further upgrades and repairs are urgently needed.
27. Among the most critical tasks of CTR are the activities relating to the dismantling of nuclear submarines. Until 1991, no pre-planning existed in the Soviet Union for dismantling them once they were decommissioned. Up to 179 Russian nuclear submarines, 36 of which are SSBNs, are in a status of accelerated decommissioning. The dismantling process is complex and costly: $8-10 million per SSBN, and $5-7 million per nuclear-powered attack submarine (SSN). CTR programmes' goal is to eliminate 41 SSBNs and 612 SLBM launchers by 2007, and there has been considerable progress in the general process. But there is not enough money to dismantle the approximately 90 decommissioned SSNs, 65 of which still have nuclear fuel aboard in 125 reactors. The problem

of consolidating fresh and spent submarine fuel, which contains HEU or plutonium, is particularly serious.

28. Several other problems have emerged in the current dismantling: there is no plan for long-term storage of reactor compartments, not enough storage facilities for spent fuel or liquid waste, and limited budget for salaries, power and resources at Russian shipyards and in the Navy. In the Kola Peninsula, spent nuclear fuel has been temporarily placed in concrete tanks or aboard floating service vessels. The European Union, Japan and Norway are partially contributing to SSN dismantlement, but so far all these additional foreign aid efforts have lacked the necessary co-ordination. On the Russian side, the Ministry of Atomic Energy (Minatom) has recently taken over the responsibility from the Navy for decommissioned submarines.
29. The NATO WMD Centre, created in 2000 at the Alliance's headquarters in Brussels, is working on the completion of a database listing all Western assistance programmes for the dismantling of weapons of mass destruction in Russia. A preliminary version of this database, named Matrix of the System Programmes, will be available in electronic format at the end of 2001.
30. The Russian Federation is also facing a number of complicated environmental problems in the management of radioactive waste accumulated as a result of past production of nuclear weapons, use of nuclear energy for peaceful purposes, and as a result of the reductions in nuclear arms. In the past, radioactive wastes have been dumped in the Kara and Barents Seas, as well as in lakes in Siberia, generating serious environmental concerns. Scientific analyses conducted by Norway and Russia, however, have concluded that radioactive release in the Arctic seas is minimal. A Russian Federal Waste Management Programme for 1996-2005, approved by the government in 1996 to solve the country's most urgent problems, could not be implemented for lack of funds. An international initiative under the auspices of the International Atomic Energy Agency (IAEA), the Contact Expert Group (CEG), was set up in 1996 to work with Russia on solving the most urgent problems. According to IAEA officials who met with members of this Committee in Vienna in March 2000, the CEG is lacking funds to implement even the most urgent projects and is trying to call on the G-7 countries to find new donors.

III. FISSILE MATERIAL

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31. There are no publicly-available official figures on the amount of weapons-usable fissile material in the countries of the former Soviet Union. For weapons-usable fissile material we intend plutonium (Pu) and highly enriched uranium (HEU), containing

more than 20% of the isotope U-235 (natural uranium contains 0.7% U-235 and 99.3% U-238). HEU can also be defined as weapon-grade uranium (WGU) when containing more than 90% U-235. Production of HEU was halted by the Soviet Union in 1989, while Russia stopped producing Pu for nuclear weapons in 1992. This material is scattered throughout military and civilian facilities, including nuclear weapon research, design and production facilities; nuclear fuel production plants; and research, educational and industrial facilities. Most of these institutes and plants are located in Russian territory, but a few are in other NIS, including Belarus, Kazakhstan, Latvia, Ukraine and Uzbekistan.

32. According to various sources, the total HEU stockpile in Russia can be estimated at between 735 and 1,365 tons. The Russian military plutonium has been estimated at 106-156 tons. According to the *Nuclear Status Report* weapons-usable material (not including the material currently in nuclear weapons) is known to be present in 56 sites in the Russian Federation, including civil, military and naval facilities. Most of it is located at the nuclear-weapon facilities of the ten closed "nuclear cities" (see below) created by the Soviet Union and now managed by Minatom.
33. In Belarus, weapons-usable fissile material (approximately 370 kg of HEU, and 15 g of Pu) is located at one facility near Minsk. Some 100kg of HEU are located at two facilities in Tashkent, Uzbekistan. Three sites in Kazakhstan are storing a few kilograms of HEU, among these facilities the breeder reactor in Aktau also stocks three tons of Pu in spent nuclear fuel. At the Nuclear Research Centre of the Latvian Academy of Science, a few kilometres from Riga, there is an unknown amount of HEU. In Ukraine, HEU is stored on three locations; one of them, the Institute of Nuclear research in Kiev, keeps small amounts of Pu as well.

A. EFFORTS TO SECURE FISSILE MATERIAL

34. The most important US programme dealing with the security shortcomings identified at many of the facilities storing fissile material is the Material Protection, Control and Accounting (MPC&A) programme. Managed by DOE since 1994, the programme concentrates on enhancing the security of material at current locations, transferring material to secure sites and trying to consolidate it at facilities where improved security systems are in place.
35. Almost all the major facilities with weapons-usable fissile material are participating in DOE programmes. Nearly a dozen facilities with weapons-usable materials, however, are still not receiving US security assistance. According to the January 2001 *Report Card on the DOE's Non-proliferation Programs with Russia*, drafted by a bipartisan group of US legislators and experts, "security improvements have begun for approximately 80% of the current estimate of the Russian stockpile of nuclear weapons-usable material not contained in nuclear weapons". Comprehensive long-

term security upgrades, however, "have covered only a modest fraction" of the same material. Moreover, disputes between US and Russian officials over access to sites - notably four warhead assembly and dismantlement plants - with large quantities of material undermine the overall co-operation programme. In general, MPC&A projects have been completed at all sites outside Russia, although related projects continue at some sites in Kazakhstan and Ukraine.

36. An important CTR-funded project is the construction of a large-scale fissile material storage facility at the Mayak Production Association in Russia for the secure and environmentally safe consolidation of HEU and Pu from dismantled nuclear weapons. The facility, meant to alleviate the country's shortage of secure storage for nuclear-weapons material, could also be used to store spent reactor fuel from nuclear submarines. Completion of the first wing of the 50,000-container-capacity facility is expected by mid-2002 at a total cost of $413 million. The US Congress, however, has attached certain conditions to the funding of the Mayak facility, notably that it should accept materials only from dismantled nuclear weapons. So far, Russia has not agreed to US inspectors verifying the weapons origin of the material, stating that such measures are not authorised in their agreements.
37. Another DOE programme is the 1993 HEU Agreement which authorised the United States to purchase, over 20 years, 500 tons of HEU from dismantled Soviet nuclear weapons and convert them to low enriched uranium (LEU) to be used as civilian reactor fuel. The deal was originally valued at $12 billion, but the subsequent collapse of the price of uranium led to a prolonged re-negotiation. In 1999, DOE and Minatom signed a new accord reviving the HEU agreement.
38. A more recent US programme aims at reducing weapons-usable Pu in step with the US Pu disposition programme. Signed in 2000, the agreement establishes US and Russian commitment to dispose of 34 tons of excess military Pu. Approximately $2 billion will be necessary to Russia to implement the agreement and convert excess Pu in order to produce mixed oxide fuel (MOX) to be used in nuclear power reactors. The United States, which plans to immobilise through vitrification at least nine tons of that Pu, has provided $200 million in funding, and an international financing plan was presented at the 2001 G-8 summit in Genoa, Italy. The European Union which, in the context of its Common Foreign and Security Policy (CFSP), has launched a Joint Action for Non-proliferation and Disarmament, will contribute to the programme.
39. Related to the security of fissile material is the problem of combating illicit trafficking across Russia's borders and those of other NIS. The Second Line of Defense (SLD) programme, started in 1998, encompasses a series of initiatives led by a number of US governmental agencies and aimed at helping NIS cope with these problems. These initiatives focus mainly on export control assistance, improving border controls and strengthening overall capacity to detect and deter illicit trafficking. Although it is

difficult to assess the effectiveness of these US assistance programmes, there is general agreement that overall risks of illicit trafficking have been mitigated. But some challenges remain and proliferation risks are not totally eliminated.

IV. NUCLEAR CITIES AND SCIENTIFIC CO-OPERATION PROGRAMMES

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40. In Russia, ten "nuclear cities", home to 750,000 people, today remain closed off from the outside world, protected by security forces and barbed wire. They were built by the Soviet Union for the sole purpose of designing and producing nuclear weapons and fissile material. Minatom still employs more than 120,000 people in these cities' nuclear facilities, but plans to reduce the staff by half over the next six or seven years. Several problems derive from the necessary downsizing of this huge complex which Russia cannot afford anymore:
    - the physical security of nuclear weapons and fissile material still stored on site;
    - the "brain drain" problem, or the risk that the number of already underpaid and soon-to-be unemployed nuclear weapon scientists, engineers and technicians turn to illicit activities or to work for a state of concern;
    - the risks deriving from operating the last three unsafe plutonium-production reactors in the nuclear cities of Tomsk-7 (now Seversk) and Kasnoyarsk-26 (now Zheleznogorsk);
    - the re-conversion of nuclear weapon facilities to civilian purposes.
41. Several Western initiatives have tried to help Russia cope with some of these urgent problems. The Initiatives for Proliferation Prevention (IPP), in place since 1994, seek to prevent a brain drain by creating non-weapons-related work for Russian scientists and technicians. Under this project, DOE's national laboratories and their counterparts in Russia develop projects with commercial potential. The complementary Nuclear Cities Initiative (NCI), established by DOE in 1998 in partnership with Minatom, Western companies and private foundations, offers opportunities for short-term contract employment to scientists who have lost their jobs. NCI also assists Russian nuclear cities in creating the municipal and telecommunications infrastructures necessary to attract and establish long-term business opportunities.
42. An additional initiative is the International Science and Technology Centre (ISTC), funded by the US Department of State, the European Union, Canada and Japan. Its purpose is to provide short-term grants and contracts engaging former Soviet weapon scientists and experts in non-military research projects. Since 1994 ISTC,

with its two Centres in Moscow and Kiev, has granted some _120 million to over 1,000 projects involving about 30,000 scientists.

43. Since 1995, NATO's Scientific and Environmental Affairs Division is also contributing to scientific co-operation in weapons-related areas through its Security-Related Civil Science and Technology (SST) programme. The programme has so far engaged over 2,700 scientists. In four different support mechanisms (expert visits, collaborative linkage grants, advanced study institutes and advanced workshops).

V. ASSESSING THE THREATS

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44. Many of the problems related to dismantling and securing former-Soviet Union nuclear weapons and fissile material have already been highlighted in the previous sections. Major proliferation risks derive from the still insufficient security of this vast nuclear stockpile. Threats could come from insiders such as underpaid and demoralised military or security staff, or outsiders such as terrorist groups or criminal organisations.
45. Considerable security concerns derive from "the human factor in proliferation", as it has been defined by *Russia's Nuclear and Missile Complex*, a study by CEIP Non-Proliferation Project. The study, based on a survey conducted in enterprises located in five of the ten nuclear cities, highlighted (1) the risk that a number of these highly trained workers "might be tempted or even compelled to sell whatever was close at hand, or themselves, in order to make ends meet"; and (2) the fact that, because of its economic problems, "Russia is already facing a degradation in the skills of its nuclear experts", which undermines its ability to maintain a modern nuclear arsenal.
46. While most analysts generally rule out the possibility of theft and transport outside of Russia of a nuclear weapon, attacks on the weapons themselves or their storage sites seem more plausible. Several incidents of Russian soldiers attacking their comrades have been reported throughout the country: similar incidents could occur at nuclear bases or storage sites. The impoverished condition of the Russian armed forces, as well as their decaying ethics, cause concern. According to media reports, there is a general increase in drug-related crimes in the SRF, while organised crime has infiltrated the Northern Fleet, and minor corruption is almost endemic in the military and in public administration.
47. The possible smuggling of nuclear materials across NIS borders is probably the most pressing proliferation threat coming from the former Soviet Union territory. In the early 1990s, when security at most facilities had not yet been improved by CTR programmes, several attempts to smuggle quantities of fissile material were prevented by Russian and international police operations. Increased

border control and overall security at nuclear sites were credited with the fact that no incidents were reported between 1996 and 1998. But in late 1998, the Russian Federal Security Service halted an attempt by a group of employees from one of the Minatom nuclear facilities in Chelyabinsk-70 to steal 18.5kg of fissile material. Since April 1999, six more incidents have been reported, including the April 2000 seizure of about a kilogram of HEU in the form of fast reactor pellets in Batumi, Georgia. According to IAEA, in most cases the quantity of fissile material is small compared with the amounts required for a nuclear explosive. It is estimated, however, that only 5-10% of the illegal traffic in radioactive materials is detected because, among other reasons, most radiation monitors at border crossings do not work.

48. Social conditions in nuclear cities can pose particularly serious problems. Early in 1998, the mayor of Krasnoyarsk-45 wrote to the Republic's governor, General Alexander Lebed, warning that a social explosion in the city was unavoidable unless some action was taken. General Lebed had earlier proposed that Moscow let the regions take responsibility for nuclear forces and facilities on their territories, but the Russian government has never agreed to the proposal. Later the same year, 3,000 workers went on strike at Chelyabinsk-70, protesting "constant under-nourishment, insufficient medical service and inability to buy clothing and footwear for children or to pay for their education".
49. The poor security conditions of Russian naval nuclear fuel are, in the words of one Minatom official, an "accident-prone situation". Some 70 tons of fuel containing HEU reside in operational nuclear submarines, icebreakers and cruisers, as well as in the number of decommissioned submarines that still contain operating reactors. According to an expert at the Center for Non-proliferation Studies in Monterey who addressed this Committee in October 2000, "possible theft, diversion or sale of fissile material is the greatest proliferation and security risk arising from current conditions in the Russian naval nuclear fuel cycle".
50. During a Sub-Committee visit to Norway in May 2001, representatives of the Ministry of Foreign Affairs and the Norwegian Radiation Protection Authority (NRPA) confirmed the poor security conditions of spent fuel assemblies from Russian submarines and icebreakers. Spent fuel is generally considered too radioactive to be handled safely and therefore "self-protecting". However, a NRPA study concluded that after less than 30 years the radioactivity would have decayed sufficiently for thieves or smugglers to extract HEU and Pu.
51. The risk of theft or diversion of sensitive weapons components or technologies also deserves attention because of the advantage it would give to potential proliferators. An example of this is the quite well-known case of the missile guidance gyroscopes and accelerometers from Russian SLBMs discovered in Iraq in 1995 by UNSCOM. Removed from dismantled missiles, the components were probably illegally sold to Iraq by the employees of a Russian dismantlement facilitv. In December 1998. a member of the staff at

Russia's nuclear weapons laboratory in Sarov (formerly Arzamas-16) was arrested while attempting to sell nuclear weapons designs to Iraqi and Afghani agents.

52. These are only a few examples of the dozens of actual incidents. It is clear that Russia, ten years after the end of the Soviet Union, still has a weakened ability to protect and secure its legacy. Additional concerns now stem from the situation in some countries of Central Asia and the Caucasus, where border controls are looser and criminal organisations on the rise. These Republics are also geographically closer to potential end users of smuggled fissile material and weapons technologies: Islamic terrorist groups and countries such as Iran, Iraq and Syria.
53. A different, although not less worrying, form of threat is represented by the dangerous state of decay of Russia's defence equipment and technologies. Of primary concern are space-based defence systems, designed to detect missile launches from the United States. Moscow has only one surviving early-warning satellite out of nine, which allows a mere six hours a day of actual monitoring. Experts warn that this situation could cause the accidental launch of a ballistic missile. Russia has a sufficient number of new early-warning satellites ready for launch, but the military is spending its limited funding on other projects.
54. Russian submarines are armed with many sophisticated weapons requiring careful handling. According to the latest news, the *Kursk* tragedy was caused by a torpedo that malfunctioned or was mishandled by the crew. The *Kursk* was an Oscar II class nuclear submarine carrying cruise missiles, not an SSN or SSBN armed with even more sophisticated weapons. Equipment at Russian navy facilities is often aging and unsafe and can cause accidents. In June 2000, at a naval base near Vladivostock, a crane scheduled for retirement in 1995 dropped an unarmed SLBM. The fall caused the release of the missile's oxidizer, killing 12 sailors.

VI. THE POLITICAL CONTEXT

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55. The co-operative security activities that were put in place between Washington and Moscow to tackle the proliferation problems in Russia and the NIS represent a unique and sensitive agenda. Initiated during George H.W. Bush's presidency, the development of most of these initiatives was the product of the Clinton-Yeltsin years. The friendship between the two men certainly gave political stimulation to activities that the Russian bureaucracy might have preferred to limit to non-sensitive areas. Over the years, some in the United States questioned the help the US government was giving Russia in such a difficult undertaking and accused Moscow of not making a sufficient commitment to threat reduction. Some answers to this have been offered by the cited *Report Card*.

"Currently", it observed, "Russians cannot accomplish these projects without US assistance". Also, "quite simply, an unstable Russia - economically, politically or security-wise - is not in the national security interest of the United States".

56. However, the political circumstances that supported the initiation and development of the co-operative security activities have certainly changed, probably signalling the beginning of a new era in US-Russian relations. While political problems have periodically threatened support for non-proliferation and disarmament efforts on both sides, no major programmes were cancelled during the NATO bombing of the Former Republic of Yugoslavia (FRY) in 1999. The Russian military campaign in Chechnya brought only a few US legislators to call for a reduction of co-operation funds.
57. In the last few months, several developments have pointed to a deterioration in the relationship between Russia and the United States. Russia is genuinely concerned about US plans to build a ballistic missile defence system, or National Missile Defense (NMD), that could lead to a decision by Washington to abrogate the ABM Treaty. Russian officials, including President Vladimir Putin, have repeatedly declared that a NMD deployment would lead Moscow to consider increasing the number of warheads on its ICBMs, or even withdrawing from START II. In February 2001, Russia also sent a clear message by launching an array of missile tests from sea, air and land. Later this year, Russian government officials welcomed the Bush administration's call for real consultations on missile defence and, while they have not agreed to US plans, they do seem committed to a substantive exchange of views.
58. Some quarters in Russia have criticised the co-operative security agenda, pointing to the penetration of US specialists at sensitive facilities and questioning the financial benefits of this co-operation. President Putin, however, has made no political statement on it and has expressed support for the HEU purchase agreement. In fact, Russians derive significant benefits from these co-operative initiatives: governmental agencies and research centres receive vital financing, and a number of technicians, engineers and scientists are able to continue their work.
59. In the United States, although co-operative security programmes have been consistently supported by a bipartisan majority during the last ten years, a number of studies and reports have criticised them. In recent times, critics have increased in number. US government officials have regularly expressed their frustration at making these programmes work in Russia amidst an array of bureaucratic and technical difficulties. Others have accused the programmes of spending too much in Russia and not enough on US contractors; of spending too much on US experts' trips and on personnel, and not enough on improving conditions at nuclear facilities in Russia; and of indirectly supporting Russian rearmament and weapons modernisation.
60. During the presidential campaign, George W. Bush made several positive statements about continuing to co-operate with Russia in

the area of nuclear security. But the Bush administration has recently proposed to reduce the total budget for Defense Nuclear Nonproliferation by $100 million in 2002. In particular, the MPC&A programme (the most important for protecting fissile material) would be cut from $170 million this year to $139 million in 2002. Experts note that as this programme enjoys consistent bipartisan support, Congress will probably restore MPC&A's budget to at least 2001 levels. Other programmes, however, are more likely to be downsized. According to the Bush administration's proposed 2002 budget, for instance, the Nuclear Cities Initiative would be cut by 75% from $26.6 million to $6.6 million.

61. Strong political concerns are sparked by Russia's continued co-operation with Iran in the nuclear energy field. The US government is convinced that the help Russia is giving Iran in completing a nuclear power plant in Bushehr is in fact supporting Tehran's nuclear weapons programme. Russia denies the accusation, but a proposed shipment to Iran of a laser isotope separator (useful in uranium enrichment) was recently stopped by Washington. Moreover, many in the United States are disturbed by Russia's continuing sale of conventional weapons to Iran, India and other countries.
62. Many in the international community are also strongly criticising a controversial Russian scheme for importing 20,000 tons of spent nuclear fuel over 20 years for storage and eventual reprocessing. In July 2001, President Putin signed a bill, already approved by the Duma, allowing imports of nuclear waste that could earn Russia up to $21 billion in the next ten years. The Kremlin has also set up a commission to study the environmental impact of such a plan.
63. Additional concerns with regard to Russia's policies may have a more direct impact on co-operation with the United States in the area of non-proliferation. President Putin has revived several Russian security agencies, which have put pressure on the ministries dealing with US officials in the context of security co-operation activities. Although Mr Putin has spoken out in favour of downsizing the Russian nuclear arsenal, he has also stressed the need for Moscow to retain a strong nuclear capability. This was reinforced by the approval, in April 2000, of a new military doctrine which allows the use of nuclear weapons in response to any other weapons of mass destruction, and against any country or coalition if the situation is critical to Russian national security, even if the adversary does not possess nuclear weapons.
64. European NATO allies and Western countries in general can do much to support US policies and offer a more substantial financial contribution to some of the activities on the security co-operation agenda. This will also send a strong political signal to Moscow which tends to see these activities only in the context of its bilateral strategic relations with the United States. In this sense, the Non-proliferation and Disarmament Co-operation Initiative (NDCI), an information exchange platform recently launched by the European Union to support the US 1999 ETRI programme, is a welcome step

in the right direction.

VII. CONCLUSION

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65. The Rapporteur shares the general assessment of the Task Force that drafted the 2001 *Report Card*: "current non-proliferation programs in the Department of Energy, the Department of Defense, and related agencies have achieved impressive results thus far, but their limited mandate and funding fall short of what is required to address adequately the threat". In line with what the Task Force also indicated we can affirm that, to face this urgent security challenge, an "enhanced response" should be devised by the new US President in consultation with Congress and in co-operation with Russia and all the allied countries equally concerned by the threat. Based on these premises, the Rapporteur would like to offer a few policy recommendations as to how to shape this "enhanced response".
66. A necessary precondition for a more effective programme is an agreement between the US and Russian governments on the degree of transparency and access needed to ensure that all co-operative activities have measurable impacts on programme objectives. Also, on both sides, a more centralised command and co-ordination of the financial and human resources is essential to conduct the programme successfully.
67. In the area of **strategic weapons dismantling and weapons protection, control and accounting** - projects that have been quite successful - specific improvements may include:
    - Assisting the Russians as they identify, tag and seal all their warheads as part of a reliable accounting system;
    - Rapidly agreeing on WPC&A upgrades to the 123 nuclear weapon storage sites selected by the Russian government, eventually establishing priorities;
    - Commissioning an expert evaluation of missile solid-fuel disposition options, given the significant technological uncertainties;
    - Defusing proliferation risks from the sale of potentially useful components from dismantled missiles by accounting for or destroying them in a verifiable manner;
    - Strengthening the existing Russian programmes to improve personnel reliability and limit the insider threat.
68. More profound improvements and additional initiatives are needed in the area of **nuclear submarine dismantlement and naval fuel consolidation.** In this area, the United States should encourage substantial financial and technical contributions from allies. The most urgent actions should include:
    - Accelerating the dismantling of SSNs;
    - Increasing spent fuel storage sites and improving their

physical protection measures;

- Encouraging Minatom and the Russian Navy to develop a complete "cradle-to-grave" submarine dismantling cycle, including plans for long-term storage of separated reactor compartments;
- Launching an international (United States and allies) programme to encourage defence conversion at Russian shipyards by providing incentives for Western firms operating in Russia;
- Prohibiting any Russian sale of nuclear submarines and related technologies to foreign countries.

69. The 1991-92 informal regime on **tactical nuclear weapons** seems particularly vulnerable to the impact of both new Russian thinking about nuclear weapons and possible US withdrawal from the ABM Treaty. Important steps could be taken to reinforce this regime:
    - Reaffirming in a joint statement the continued commitment of the United States and Russia to the 1991 parallel, unilateral statements or signing an executive agreement to that effect. European NATO allies should strongly support any initiative in this sense;
    - Including tactical nuclear weapons in a possible larger deal between the United States and Russia involving ABM Treaty modification, START III or any other form of nuclear disarmament;
    - Initiating negotiations on tactical nuclear weapons reductions.
70. In the area of **fissile material**, successes and shortcomings of the ongoing programmes suggest a series of recommendations:
    - Consolidating fissile material at fewer sites and considering consolidating material from other NIS to Russia;
    - Helping Russia and NIS to provide their nuclear personnel with adequate organisation, motivation, training, equipment and resources to perform the mission of safeguarding nuclear material;
    - Demilitarising all remaining excess Russian HEU through a programme of US investment in expanded capacity for down-blending in Russia;
    - Discouraging the Russian government from putting into effect the scheme for importing and eventually reprocessing 20,000 tons of spent nuclear fuel by ultimately threatening cuts of funding if Western-financed facilities, such as the Mayak storage complex, are used for this purpose;
    - Accelerating the purchase of the approximately 400 tons of HEU remaining to be down-blended under the HEU Agreement;
    - Halting plutonium production in the three still-operating reactors in Siberia by implementing the 1997 Plutonium Production Reactor Agreement (PPRA) that should result in the shut-down of two of the reactors by 2005 and the third by 2006;
    - Accelerating the construction of the nuclear storage facility

at Mayak, in order to store up to 50 tons of excess plutonium, and eventually build additional wings to store more material;
    - Eliminating up to 100 tons of plutonium by blending fuel as MOX or immobilising it through vitrification.

71. Other more general recommendations to reduce the Russian nuclear complex and implement existing programmes could include:
    - Facilitating Russian efforts to shut down weapons assembly, component fabrication and materials production facilities;
    - Helping Russia to ensure that nuclear weapon scientists and workers are provided with financial incentives for early retirement;
    - Increasing international lending practices to new businesses in the nuclear cities, finding ways, eventually, to extend credit at competitive rates to businesses employing former scientists or technicians;
    - Enhancing the relationship between the municipalities and the weapon facilities of the nuclear cities in order to increase efficiency in the expenditure of resources.
72. In general, European NATO allies and the European Union should step up their diplomatic, financial and technical contribution to the overall "enhanced response" to the threats described above, especially in the areas of securing fissile material, combating illicit traffic, assisting scientists and technical personnel, and creating business opportunities in the former Soviet nuclear-industrial complex.
73. Finally, considerable advantages might derive from the adoption of international non-proliferation initiatives, such as an agreement on a Fissile Material Cut-off Treaty (FMCT), a ban on the production of material for nuclear weapons, and the introduction of the strengthened international safeguards system supported by the 2000 Nuclear Non-Proliferation Treaty (NPT) Review Conference. Unfortunately, negotiations on the FMCT, although on the agenda of the Conference on Disarmament in Geneva, are kept on hold by the obstruction of Russia and China. These two countries have insisted that FMCT negotiations can only start in parallel with negotiations on nuclear disarmament and prevention of an arms race in outer space. The United States opposes this linkage.

APPENDIX
RUSSIAN NUCLEAR FORCES

Type/Name	Launcher/SSBNs	Year	Warheads	Total
ICBMs				

ICBMs				
SS-18 Satan (RS-20)	180	1979	10 x 550/750	1,800
SS-19 Stiletto (RS-18)	150	1979	6 x 550	900
SS-24 Scalpel (RS-22)	36/10	1987	10 x 550	460
SS-25 Sickle (RS-12M)	360	1985	1 x 550	360
SS-27 (Topol-M)	24	1997	1 x 550	24
Total	760		2,292 MT	3,544
SLBMs				
SS-N-18 Stingray (RSM-50)	176	1978	3 x 500	528
SS-N-20 Sturgeon (RSM-52)	60/3	1983	10 x 200	600
SS-N-23 Skiff (RSM-54)	112	1986	4 x 100	448
Total	348		429 MT	1,576
Sub-Total, Ballistic Missiles	1,108		2,721 MT	5,120
BOMBERS				
Tu-95/Bear-H6	29	1984	6 AS-15A ALCMs x 250kT	174
Tu-95/Bear-H16	34	1984	16 AS-15A ALCMs or bombs x 250kT	544
Tu-160/Blackjack	15	1987	12 AS-16 SRAMSs or AS-15B or bombs x 250kT	180
Total	78		271 MT	898
Total, Strategic Nuclear Forces	1,186 launchers		2992 MT	6,018 warheads
NON-STRATEGIC WEAPONS				
Strategic Defense				
SAM	SA-5B Gammon, SA-10 Grumble		1000	1000
Land-based Non-strategic				
Bombers and	Backfire(120),		400	1600

Fighters	Fencer (280)			
Naval Non-strategic				
Attack aircraft	Backfire (70), Fencer (70)		140	400
SLCMs	SS-N-9, SS-N-12, SS-N-19, SS-N-21, SS-N-22			500
ASW Weapons	SS-N-15, SS-N-16, torpedoes			300
Total				~4,000
OTHER WEAPONS				
Reserve/Awaiting Dismantlement				~12,000
GRAND TOTAL			**~2,900 MT (strategic weapons)**	**~22,000**

NOTE

Principal sources for this table include: Jon Brook Wolfsthal, Cristina-Astrid Chuen, Emily Ewell Daughtry (eds.), Nuclear Status Report, Carnegie Endowment for International Peace and Monterey Institute of International Studies, Washington, D.C., 2001); William Arkin and Robert Norris (Natural Resources Defense Council), Hans M. Kristensen (Nautilus Institute), and Joshua Handler, "Russian Nuclear Forces, 2001" Bulletin of the Atomic Scientists, May/June 2001, pp 78-9; START I MOU, January 2001.